ANNALS OF MEDICAL HISTORY

PUBLISHED BIMONTHLY

New Series, Vol. IV, No. 3 MAY, 1932 Whole No. 61

EDITOR

FRANCIS R. PACKARD, M.D., Philadelphia, Pa.

ASSOCIATE EDITORS

LE ROY CRUMMER, M.D.	Los Angeles
HARVEY CUSHING, M.D.	Boston
IRVING S. CUTTER, M.D.	Chicago
CHARLES L. DANA, M.D.	New York
GEORGE DOCK, M.D.	Pasadena
FIELDING H. GARRISON, M.D.	Baltimore
HENRY BARTON JACOBS, M.D.	Baltimore
HOWARD A. KELLY, M.D.	Baltimore
ARNOLD C. KLEBS, M.D.	Nyon
SAMUEL W. LAMBERT, M.D.	New York
THOMAS McCRAE, M.D.	Philadelphia
LEWIS STEPHEN PILCHER, M.D.	Brooklyn
SIR D'ARCY POWER, K.B.E., F.R.C.S.(ENG.), F.S.A.	London
DAVID RIESMAN, M.D.	Philadelphia
SIR HUMPHRY ROLLESTON, BART., K.C.B., M.D.	Cambridge
JOHN RUHRÄH, M.D.	Baltimore
CHARLES SINGER, M.D.	London
EDWARD C. STREETER, M.D.	Boston
WILLIAM H. WELCH, M.D.	Baltimore
CASEY A. WOOD, M.D.	Chicago

NEW YORK
PAUL B. HOEBER, INC., PUBLISHERS
SEVENTY-SIX FIFTH AVENUE

ANNALS OF MEDICAL HISTORY

New Series, Vol. IV, No. 3 MAY, 1932 Whole No. 61

CONTENTS

PAGE
Portrait of James Craik . . . . Cover
Portrait of Robert Whytt . . . . Frontispiece
How London and Edinburgh Influenced Medicine in Philadelphia in the Eighteenth Century . . . . . Francis R. Packard . 219
Washington's Last Illness . . . . . Fielding O. Lewis . . 245
The Life and Times of Dr. William Harvey. (Part ii) . . . . . . Sir Wilmot Herringham 249
Medicine in a Popular Medieval Encyclopedia . . . . James J. Walsh . . . 273
St. Philip's Hospital in Charlestown in Carolina . . . . Joseph Ioor Waring . 283
Dr. Lydia Folger Fowler . . . . . Frederick C. Waite. . 290
The Pharmacology of the Ancient Mexicans. . . . . David Cerna 298
Editorial 306
Washington and the Medical Affairs of the Revolution.
Book Reviews 313
Power, The Foundations of Medical History; Camac, Imhotep to Harvey; Thayer, Osler and Other Papers; Pusey, A Doctor of the 1870's and 80's; Moodie, Roentgenologic Studies of Egyptian and Peruvian Mummies; Abbott, History of Medicine in the Province of Quebec; Blanton, Medicine in Virginia in the Eighteenth Century; Sarton, Introduction to the History of Science; Storer, Medicina in Nummis; Wood, An Introduction to the Literature of Vertebrate Zoology.

Original articles are published only with the understanding that they are contributed exclusively to the ANNALS OF MEDICAL HISTORY. Manuscripts offered for publication, books for review, and all correspondence relating to the editorial management should be addressed to the Editor, Dr. Francis R. Packard, 302 South 19th Street, Philadelphia, Pa.

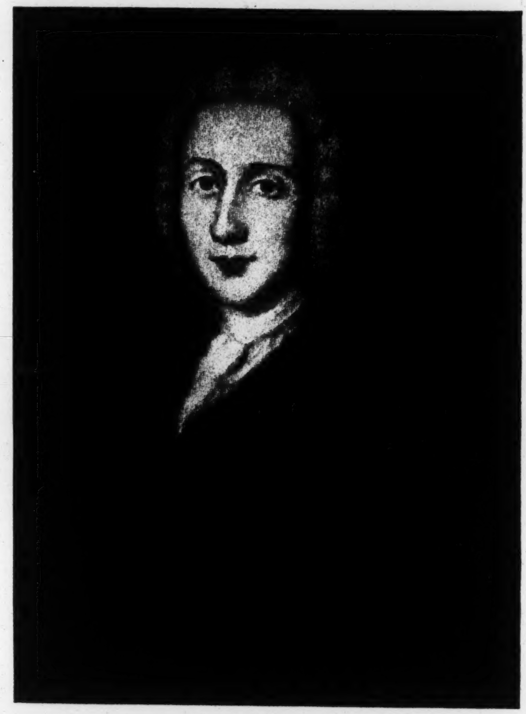
Communications regarding subscriptions, reprints, and all matters regarding the business management of the ANNALS OF MEDICAL HISTORY should be addressed to the publishers, Paul B. Hoeber, Inc. 76 Fifth Avenue, New York City. [Cable address, Formed N. Y.]

The ANNALS OF MEDICAL HISTORY is published six times a year, the six issues comprising one volume. No advertising is carried. The subscription price is $10.00 a year, foreign $11.00. Current single numbers $2.50 per copy. A few sets of first series, Volumes I–X, are available in parts as published at $100.00 per set, or bound in boards, paper sides, canvas back, paper label, $135.00 per set. Price on available single volumes or numbers will be quoted on request.

Entered as second-class matter, June 2, 1917, at the Post Office, New York, N. Y., under the Act of March 3, 1879.

Copyright, 1932, by Paul B. Hoeber, Inc.

Frontispiece
Annals of Medical History
May, 1932



ROBERT WHYTT

⟦1714-1766⟧

[From Fernelius' Universa Medican, Geneva, 1679]

ANNALS OF MEDICAL HISTORY

New Series, Volume IV May, 1932 Number 3

HOW LONDON AND EDINBURGH INFLUENCED MEDICINE IN PHILADELPHIA IN THE EIGHTEENTH CENTURY

THE S. WEIR MITCHELL ORATION*

By FRANCIS R. PACKARD, M.D.

PHILADELPHIA

AMONG Weir Mitchell's many titles to fame, I think that one of the most outstanding and permanent is that of student and writer on the Colonial period of our history. By many competent critics "Hugh Wynne" has been ranked as the greatest achievement of fiction dealing with that period. The reasons for its success, beyond its charm as a novel, are based on the vividness with which it recalls the life of the time and the accuracy with which it deals with the historic setting. "Hugh Wynne" was the work not only of a brilliant novelist but also of a profound historian, and it bears on every page evidence not only of these qualities on the part of the Author, but also of the love he bore for the place of which he wrote and his intimate knowledge of the characteristics of its inhabitants.

One aspect of eighteenth century Philadelphia in which Dr. Mitchell was most profoundly interested was the history of the origins and traditions of the medical institutions of this city, and the lives and characters of the men who established them on the high plane he was proud to think they continued to maintain. It was especially pleasing to him that the source of these institutions could be directly traced to the training received by their founders in London and Edinburgh. Weir Mitchell was of Scotch origin, his paternal grandfather having come to America from Ayrshire sometime between 1786 and 1789.[1] His father, John Kearsley Mitchell, as a little orphaned boy, was sent to some relatives in Scotland, and there received his school education and took some courses at the University of Edinburgh. Before taking up the study of medicine, however, he returned to this country, and his medical education was entirely received in Philadelphia. Weir Mitchell's own scientific relations with both London and Edinburgh were very close: he was a foreign fellow of the Royal Society; member of the Medical Society of London; honorary member of the Clinical Society of London; and, in 1895, he received the honorary degree of LL.D. from Edinburgh University. He was wont to refer with much pride to the close connection which existed between the early medical institutions of Philadelphia, particularly the Medical School of the University of Pennsylvania and this College of Physicians, and their older prototypes in Edinburgh. In 1887, in an address at the Centennial Celebration of the founding of this College, he said: "Who first suggested the formation of this College is unknown, but, as many of our Fellows were educated in Edinburgh, it is likely enough that the success of its Society which dated from 1733[2] may have led them to imitate it here." And speaking of the Founders

---

* Read before the College of Physicians of Philadelphia, November 18, 1931.

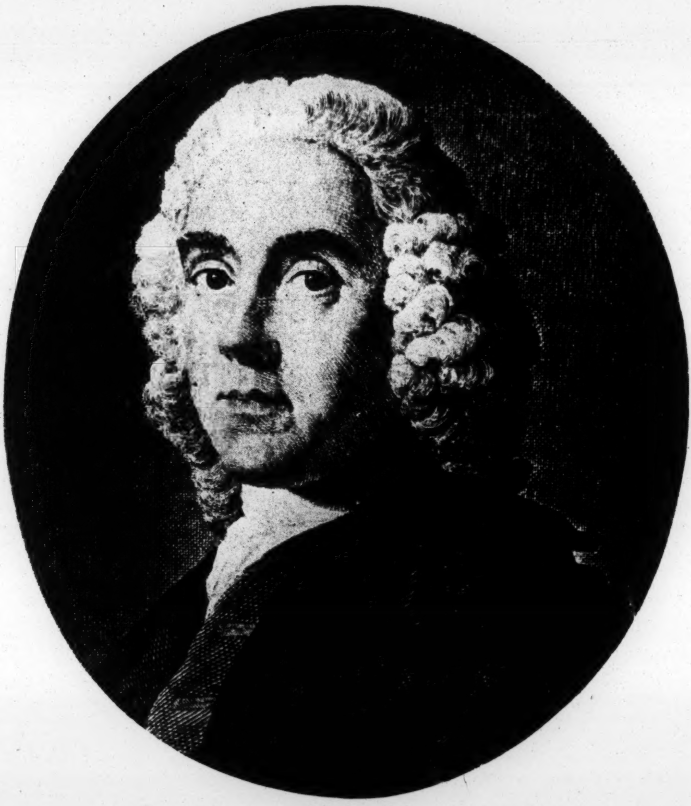


Fig. 1. Alexander Monro, *Primus* (1697–1767).
(From an Engraving after the Painting by Allan Ramsay.)

of the College, he said: "As to their medical education, the best of them had been educated in Edinburgh, which school is the parent of our University. Genealogically we might speak of our College and of the University as children of Edinburgh and grandchildren of Leyden."

When I was honored with the invitation to deliver the Weir Mitchell Oration, I could think of no subject more conformable to the mind and spirit of the great man whose memory we are honoring than a consideration of the development of scientific medicine in this city and of the English and Scotch influences which played the chief part in it. I shall ask you, therefore, to go back with me to the Philadelphia of the last half of the eighteenth century, when it was the center of medical education and science on this continent, and to glance also at the conditions in London and Edinburgh which led young men to make the then long and difficult voyage across the ocean to avail themselves of the opportunities they afforded.

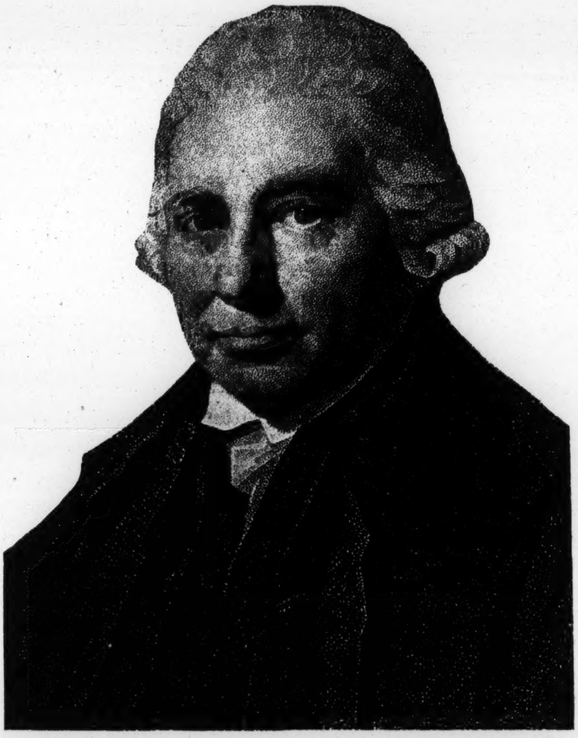


FIG. 2. ALEXANDER MONRO, *Secundus* (1733–1817). (FROM AN ENGRAVING AFTER THE PAINTING BY RAEBURN.)

In 1750 Philadelphia's population was 16,000, which had increased by 1780 to 25,000. We doubt if many cities of its size could show as large a proportion of institutions of learning or a larger proportion of citizens interested in science or culture. The Philadelphia Library had begun its career of usefulness in 1731, the

College of Philadelphia (now the University of Pennsylvania) in 1749, and the Pennsylvania Hospital was founded in 1751, and we should recall that the success of all these institutions was chiefly due to Benjamin Franklin, and that to him we also owe the founding of the American Philosophical Society in 1768, to which most of the Philadelphia doctors of whom I shall speak belonged and in whose affairs many of them took a most active part. Philadelphia can boast of three important "firsts" in the history of medicine in the British Colonies: (1) the first hospital, the Pennsylvania, founded in 1751; (2) the first public medical library, that started in the Pennsylvania Hospital in 1763; (3) the first medical school, established by the College of Philadelphia (now the University of Pennsylvania) in 1765. That these foundations succeeded so eminently in the objects for which they were designed must be attributed chiefly to the wisdom and foresight of their founders and to the training and ability of the physicians who served them, and I hope to show how largely the medical education of these men was due to the eminent teachers then flourishing in London and Edinburgh, and how the great traditions of their schools were directly inherited by the earliest medical institutions in Philadelphia and by them transmitted throughout the entire country. This is no idle boast, because though many men from other colonies, such as Samuel Bard, of New York, James Lloyd, of Boston, and Alexander Garden and Alexander Baron, of South Carolina, studied abroad and used their opportunities to forward medical education in their various localities upon their return, the medical institutions of Philadelphia were successfully launched before any others were underway elsewhere. Thus Samuel Bard was the chief factor in founding a medical school in connecton with King's College, New York, but it did not come into existence until two years after the medical school in Philadelphia, and it was completely disrupted by the Revolution and only recommenced as the medical school of Columbia College in 1787. The medical school at Harvard was not founded until 1782.

A curious feature in the history of medicine in this country is the variations in the tendencies of the young medical men who go abroad for study as to where they go. There are certain well-defined periods in these migrations. During the Colonial period and down to 1800 the majority went to London and Edinburgh, partly for the obvious reason that they regarded Great Britain as their mother country, but I think more especially because at that time London and Edinburgh were at the zenith of their fame as medical centers, for reasons to which I shall refer later. When France had settled down after the turmoil of the Revolution and the Napoleonic regime, Paris became the great medical center of the world. Osler has written delightfully of the young Americans who flocked to that city to study in the clinics and laboratories under Louis, Broussais, Dupuytren, Velpeau and other great teachers. It was under Louis that W. W. Gerhard received the training which he turned to such good account later when he studied his cases at the Philadelphia Hospital and discovered the essential difference between typhus and typhoid fever. After the middle of the last century the tide turned and until the Great War the majority of American students went to Germany or Austria for postgraduate work.

Let us begin by considering for a moment the advantages offered our young Colonial students in London. In surgery the great Cheselden who was especially famous for his skill in operating for cataract and for stone in the bladder (he could perform the lateral operation for stone in fifty-four seconds), died in 1752. His name is embalmed in the verse of Alexander Pope.

> "I'll do what Mead and Cheselden advise
> To keep these limbs and to preserve those eyes."

He had trained many students and his pupils and successors carried on his fame, and the London School of Surgery maintained its reputation, with Percival Pott, Cline and John Hunter, down to the days of Astley Cooper, Abernethy and Brodie. John Hunter was not only the greatest surgeon of this group but also one of the greatest anatomists of all time. His elder brother, William, had started an anatomical school in London in 1746. John joined him two years later, and from 1748 until William Hunter's death in 1783 and John's ten years later, these two men taught anatomy as it had never been taught before. John Hunter seems to have been particularly well disposed toward young Americans. Among those he took into his home as house pupils were Francis Kinloch Huger, the young South Carolinian who subsequently made such a gallant attempt to help Lafayette escape from his prison at Olmutz, and Philip Syng Physick, of Philadelphia. In midwifery London offered splendid opportunities to the student. William Hunter was not only a remarkable teacher of anatomy but also of midwifery. His magnificent work on "The Gravid Uterus" was the only medical book printed at the famous Baskerville press. Another very able teacher of midwifery was George McKenzie, who enjoyed an especial popularity with the American students. Although there were many excellent physicians in London, to some of whom I shall refer later, the opportunities for the study of "physic," as it was then called, did not compare with those to be got in Edinburgh.

Now let us turn to Edinburgh and see what advantages it had to offer to the student. It was in no narrow spirit of nationalism that Weir Mitchell spoke with such pride of the filiation of our medical institutions to those of Scotland. It was because he knew that in the last half of the eighteenth century medical education at Edinburgh was on a higher plane than anywhere else in the world. I can only refer to a few of the famous men who were in its faculty during that period.

Among them was Robert Whytt (1714–1766) who was not only a great physiologist but also a great physician. In his treatise entitled "Observations on Dropsy of the Brain" he gave the first accurate description of tuberculous meningitis, and his treatise on hysteric disorders is ranked as a medical classic. He was succeeded in the chair of practice of medicine by the illustrious William Cullen (1710–1790). Though not distinguished by any particular piece of original work, Cullen was a great teacher. He published a work on nosology, in which he attempted to classify diseases by certain characteristics, somewhat after the manner in which Linnaeus had classified plants. Joseph Black (1728–1799), who taught chemistry, is especially famous as the discoverer that the gas carbon dioxide was given off in both respiration and combustion. Last, but by no means least, anatomy was taught by the Monros. Everyone is familiar with the dynasty of the Monro family in the chair of anatomy in the University of Edinburgh. For three generations, and they were long ones, extending over the period from 1720 to 1846, one hundred and twenty-six years, the chair of anatomy was occupied successively by Monros. They were designated by the ordinals *primus*, *secundus* and *tertius*. Alexander Monro, *primus* (1697–1767), held the chair from 1720 until his resignation in 1758, when he was succeeded by his son, Alexander Monro, *secundus* (1733–1817). Both of these men were excellent teachers, and Alexander Monro, *secundus*, made many original contributions to anatomy and comparative anatomy. I shall only refer here to his discovery of the communication between the lateral and third ventricles of the brain, which bears his name, the foramen of Monro. When Monro, *secundus*, was sixty-five years old in 1798, he asked to have his son, Alexander Monro, *tertius* (1773–1856), appointed as his adjunct professor. The latter was only twenty-five years old and had as yet not given any token of particular fitness for the position. His father's request was, however, unfortunately acceeded to. When Monro, *secundus*, retired in 1808, the son was given the full professorship. He was a very stupid man, entirely unfit for the position. His lectures were so dull that Charles Darwin, who had begun the study of medicine at Edinburgh, gave it up rather than continue working under him. With his resignation, in 1846, the dynasty of the Monros was ended.

The Edinburgh degree of M.D. was held in much higher esteem than that obtainable anywhere else in the United Kingdom, ranking with that of Leyden, from which university its methods of teaching and practice were largely derived.

It is unfortunate that we cannot ascertain all the names of the young Americans who studied at Edinburgh, nor even their exact number. Many of them, like Ephraim McDowell, studied there, but did not take all the courses or remain long enough to get the degree, in McDowell's, and probably in many other instances, for financial reasons. Dr. J. Gordon Wilson[3] of Chicago, has recently studied the records of the University of Edinburgh. He states that:

> Edinburgh has on its roll of M.D.'s fifteen names prior to 1765, representatives from almost all the American Colonies. From 1765 to 1779, despite the interruption of the American War of Independence, 1775–1783, there are one hundred and twelve names of Americans who received the degree of M.D. We have, however, good reason to believe that they represent only part of the greater number who studied there.

Dr. John D. Comrie[4] states that "Out of thirteen graduates in 1765, five belonged to Scotland, five were Americans, two English, and one Irish."

An important feature in the life of many of the young Americans who studied at Edinburgh was the Medical Society of Edinburgh. This originated in 1734, when a group of six under-graduate medical students, who had been in the habit of spending social evenings at a tavern, agreed to meet once a fortnight at their respective lodgings, upon which occasion one of their number should read a paper in rotation, which should be discussed by the others. In the following year all but one of the little group had left the University, but John Claghorn, the one remaining, gathered to himself some other young men of the new arrivals at Edinburgh, among them William Cullen and John Fothergill, and continued the meetings. Two years later they increased their numbers and organized themselves into the Medical Society of Edinburgh. The Society met in a tavern until 1763, when it was granted permission to hold its meetings in a room at the Royal Infirmary. About the same time it agreed to form a library, which in 1778 contained no less than 1500 volumes. In 1776 it had prospered to such an extent that it was able to build a hall for itself. It had proved so useful and beneficial an organization as to receive the warm endorsement and support of the faculty and profession throughout Edinburgh. In 1779 it was granted a royal charter, and thus became the Royal Medical Society of Edinburgh. The Society opened its ranks to many of the young American students and was invaluable to them in forming connections with the best elements in the profession and in affording them the means of enjoying pleasant social intercourse with their fellow-students. In its hospitable bosom many friendships were formed which lasted long years after the sea had separated the friends. Several Americans, notably Rush, Physick and Caspar Wistar, were elected officers of the Society while in Edinburgh.

Having glanced at the advantages presented to the medical student in London and Edinburgh, let us now return to London for a few moments and consider some especial circumstances which prevailed at the time and had a most important bearing on the relations existing between the medical profession in Great Britain and the Colonies.

During the eighteenth century the Test Act, which required all students at the universities of Oxford and Cambridge to take the oath of allegiance to the Crown and the Church of England, excluded Quakers from studying at those institutions. Owing to their religious opinions, they were equally barred from pursuing a career in the army or in the church, and they were not eligible for election to Parliament. Consequently the English Quakers devoted themselves to financial or mercantile pursuits, in which many of them acquired large fortunes. With the expansion of intellectual activity and scientific inquiry which marked the epoch, many Quakers sought an outlet for their mental activities in the study of medicine and the natural sciences. The English universities being closed to them, they either went to Edinburgh, where there were no such restrictions, or on the Continent, especially to Leyden, where Francis de la Böe and the great Boerhaave had developed a world-famed center of medical education. To two of these Quaker physicians in London, John Fothergill and John Coakley Lettsom, American medicine owes a great debt.

John Fothergill (1712–1780) was the son of a Quaker preacher. Probably his interest in America was largely due to the fact that his father had felt called upon to travel through the American Colonies on several preaching missions, and his brother Samuel had also visited them for the same purpose and had been much interested in the affairs of the Quakers in America. After graduating in medicine from Edinburgh, in 1736, John Fothergill went to London, and after serving several years at St. Thomas's Hospital, settled in practice in that city. He soon acquired one of the best practices in London. He said to Samuel Bard that he "had crept over the backs of the poor into the pockets of the rich." He was deeply interested in botany and the natural sciences. At his country seat, at Upton, he had a botanic garden in which the collection of foreign plants was only surpassed in England by that at Kew. One of his chief assistants in the formation of this collection was Peter Collinson (1699–1768), the English botanist, who was a correspondent of John Bartram (1699–1777), the Philadelphia botanist, with whom he arranged to send him living specimens of American trees and plants which Collinson in turn distributed to Fothergill and other English collectors. Collinson was also a correspondent of Benjamin Franklin and sent to the latter some electrical appliances with which Franklin conducted his famous experiments. When Franklin reported the results of these to Collinson, the latter showed his letters to Fothergill, who was so impressed that he communicated them to the Royal Society, by which they were so much esteemed that it bestowed the Copley Medal on Franklin in 1753. Fothergill caused Franklin's experiments to be published in London and the two men maintained an active correspondence with one another until Franklin's arrival in London, in 1757, when he and Fothergill became close personal friends, a friendship which was only terminated by death. During Franklin's long sojourns in England every young colonist who went abroad to complete his medical studies sought his friendly advice and offices. Through his connection with Fothergill, Franklin was able to help them to obtain positions as dressers or assistants in the London hospitals, or get access to the special courses given by the Hunters or others of the great London teachers, and finally send them off to get their degrees at Edinburgh, Fothergill's alma mater. Fothergill aided the cause of medical education even more directly. To him belongs the credit of founding the first public medical library in the British colonies. In 1762 he sent to the managers of the Pennsylvania Hospital a book entitled "An Experimental History of the Materia Medica" by William Lewis, F.R.S., which Fothergill wrote was a present to the hospital "for the benefit of the Young Students in Physic who may attend under the Direction of the Physicians." Shortly afterward, in 1763, the medical staff informed the managers that they proposed to devote all the fees to which they were entitled from students attending their courses at the hospital to the purpose of buying books and establishing a medical library in the hospital. The managers approved the idea and agreed to furnish a room for the books. Dr. Fothergill's present is still on its shelves. I shall refer again to another gift of Dr. Fothergill's to the Pennsylvania Hospital, a beautiful set of large anatomical pictures to be used in teaching anatomy. They were made by van Rymsdyk, a Dutch artist living in London, and cost Dr. Fothergill the handsome sum of two hundred guineas. Van Rymsdyk was the best anatomical artist of his day. He made most of the illustrations for William Hunter's famous book on "The Gravid Uterus." In honor and remembrance of Dr. Fothergill the Medical Society of London established a Fothergillian medal. In 1888 this medal was awarded to our late distinguished president, Dr. Hobart A. Hare, for an essay on "Diseases of the Mediastinum" and was bequeathed by him to the College of Physicians where it is now deposited.

John Coakley Lettsom (1744–1815) was Fothergill's close friend and colleague. He is probably chiefly recalled to most of us by the famous couplet on his name which is current in many versions:

When patients sick to me apply,
I physicks, bleeds and sweats e'm.
There's some get well and some that die,
What's that to me,
I. Lettsom.

(The initial letter J was frequently written I at that time.) Lettsom was the son of English parents, living in the West Indies. He was one of the last of seven pairs of twins to which his mother gave birth, and he and his twin brother were the only ones to survive their infancy. Lettsom studied medicine in London, Paris and Edinburgh, but got his M.D. at Leyden in 1769. In July, 1800, he sent over some of Dr. Jenner's vaccine material to Dr. Benjamin Waterhouse in Boston, which is generally supposed to have been the first utilized in this country for the purpose of vaccination. Lettsom was very zealous in befriending American students in London, and acted as agent in England in the purchase of books for the Pennsylvania Hospital's Library.

That the memory of these two early benefactors of American medicine was kept green by at least some who appreciated their efforts, we gather from the fact that Dr. Benjamin Rush's son, James Rush, named two tracts of land which he owned in western Pennsylvania after them: one on Sugar Creek was called Lettsom, and the other on Loyalist Creek, Fothergill.

Another kind friend to the American students in London was Sir John Pringle (1707–1782), the famous pioneer military hygienist, at one time surgeon-general of the British Army. He used to make them welcome to his house as well as aiding them with advice as to their studies.

It was the ever-helpful Benjamin Franklin, however, who was the most important aid to his young fellow-countrymen. It may be recalled that Franklin visited England three times. His first trip was made in 1725–1726, when, at the instigation of Sir William Keith, he went over to London, where he worked at his trade as a printer. In 1757 he went to London as the representative of Pennsylvania in the disputes between the inhabitants of that province and the proprietaries, the Penns. On this occasion he stayed in England for six years, returning to Philadelphia late in 1763. During this sojourn he frequented the best circles in London, was a zealous attendant at the meetings of the Royal Society and was treated with much consideration by Fothergill, Lettsom and many other prominent persons. He made a visit to Scotland, where he was much entertained and made many friends, among them Lord Kames and Sir Alexander Dick. The University of Aberdeen conferred the honorary degree of LL.D. upon him in 1759. Franklin's last visit to London began in 1764, when he was sent over as agent for Pennsylvania, New York and New Jersey in the disputes then pending with the government of Great Britain. He was received with open arms by his English friends. This time he remained for nine long years, not returning to Philadelphia until 1775. The importance of these trans-Atlantic sojourns of Benjamin Franklin in relation to scientific, educational and medical affairs in the Colonies, especially in Pennsylvania, cannot be overestimated. Treated on terms of friendship and esteem by the most intellectual circles in London, Franklin used his opportunities to aid his countrymen in their efforts to better cultural affairs in America to the fullest extent, and that they amply repaid him, at least as far as the profession of medicine was concerned, I hope to demonstrate. There was one noticeable exception to the favor accorded Franklin by the London intellectuals. Although our fellow-townsman, A. Edward Newton, has recently published a most delightful report of an imaginary dinner at the publisher Strahan's at which both Samuel Johnson and Benjamin Franklin were guests, he admits that he doubts if they ever encountered one another. There is no mention of any such meeting in Boswell. Perhaps it was just as well when we recall that on one occasion when dining with Dilly, the publisher, Johnson suddenly burst forth with "I am willing to love all mankind except an American," to the astonishment of Miss Seward, the poetess, and Mrs. Knowles, a gentle Quakeress, who were among the guests.

Franklin's own views on the educational opportunities for the student of medicine in London and Edinburgh are given in a letter to Dr. Thomas Bond, written February 5, 1772.[5]

And now having considered the inducements which led young Americans to go to London and Edinburgh for medical study, and what opportunities were afforded them when they got there, let us come back to Philadelphia and see what use they made of these opportunities after their return. The biographies of these men who laid the foundation of medicine in this city have been so fully written and are so readily available that I shall not give them in detail, but shall only deal with that part of their careers which bears upon our subject, or which throws some light upon their personal characteristics, because I cannot but think that the latter were much affected by their intercourse with the cultivated members of their profession with whom they came in contact in London and Edinburgh.

The first Philadelphian to utilize the advantages of his studies in London for the benefit of his fellow-practitioners in Philadelphia was Thomas Cadwalader (1708–1779). He went abroad and worked under the great Cheselden. After his return to Philadelphia, about 1730, he gave some anatomical demonstrations to his colleagues which were greatly appreciated. Dr. Cadwalader was one of the consulting physicians to the Pennsylvania Hospital. He wrote "An Essay on the West India Dry Gripes," which was printed by Benjamin Franklin. The "Dry Gripes" was very prevalent in Philadelphia because of the very general habit of the citizens of drinking punch made from Jamaica rum. The latter was distilled in leaden pipes and the disorder was really lead poisoning. Dr. Cadwalader was distinguished for his benevolence and his kind and gentle manners. The latter saved his life on one occasion. A Lieutenant Brulman, of the British Army, became suddenly insane and sallied forth with a gun resolved to shoot the first man he should meet. This happened to be Dr. Cadwalader, who, bowing pleasantly, said to him: "Good morning, Sir, what sport?" The lieutenant replied civilly and fell into conversation, during which he was so charmed with the doctor's pleasing ways that he abandoned his murderous intentions. They parted, and a few minutes later the lieutenant met Mr. Robert Scull, whose manners failed to charm him as had those of Dr. Cadwalader; so he shot him dead, for which he was duly executed.[6]

A close associate and friend of Thomas Cadwalader was John Redman (1722–1806), the first President of this College, whose picture hangs back of our President's chair. Although he did not graduate from the University of Edinburgh, he studied there for a year, and also spent a year working at Guy's Hospital in London, before he went to Leyden, from which University he received his M.D. in 1748. He was one of the consulting physicians to the Pennsylvania Hospital, and had probably more private pupils, or apprentices, than any other physician of his day in Philadelphia. Although he never taught in the medical school, he was a trustee of the College of Philadelphia and took a very active part in its affairs. It was said of him that "in a sick room he possessed the virtues and talents of a specific kind; he suspended pain by his soothing manner, or chased it away by his conversation, which was occasionally facetious and full of anecdotes, or serious and instructive, according to the nature of the patients' diseases or the state of their minds." We have the following word picture of Dr. Redman in his old age, which Watson[6] quotes from one who had often seen him:

> The doctor, who lived in Second Street near Arch, had retired from practice altogether, and was known to the public eye as an antiquated-looking old gentleman usually habited in a broadskirted dark coat, with long pocket flaps buttoned across his under dress; wearing, in strict conformity with the cut of his coat, a pair of Baron Steuben's military shaped boots, coming above the knees for riding; his hat flapped before and cocked up smartly behind, covering a full-buttomed powdered wig, in the front of which might be seen an eagle-pointed nose separating a pair of eagle-black eyes, his lips exhibiting now and then a quick motion, as though at the moment he was endeavoring to extract the essence of a small quid. As thus described in habit and person, he was to be seen almost daily, in fair weather, mounted on a short, fat, black, switch-tailed horse, and riding for his amusement and exercise, in a brisk racking canter about the streets and suburbs of the city.

And now let us consider the men who organized and taught in the first medical school founded in this country, the Medical School of the College of Philadelphia, as the University of Pennsylvania was then known. At the time when the medical school was founded, in 1765, there were five physicians on the board of trustees of the College, viz., Thomas Bond, Phineas Bond, Thomas Cadwalader, William Shippen, Sr., and John Redman, all of whom with the exception of William Shippen, Sr., had enjoyed the advantage of studying abroad, and the first six men who held professorships: John Morgan, William Shippen, Jr., Adam Kuhn, Benjamin Rush, Philip Syng Physick and Caspar Wistar, had all of them received the degree of M.D. from the University of Edinburgh. This furnishes a ready explanation for the fact mentioned by Carson[7] in his history of the Medical Department of the University of Pennsylvania: "From a comparison of the course of instruction in the College of Philadelphia, from the time of its inception to that of its complete organization, with that of the University of Edinburgh, there can be no doubt that this distinguished school was taken as the model for imitation." Until the temporary abrogation of the charter of the College of Philadelphia, in 1779, every member of the faculty was a graduate in medicine of the University of Edinburgh.

A brief review of the work of the teachers in the Medical School of the College of Philadelphia during its early years will show how splendidly the leaven of London and Edinburgh worked in the growth of the young school.

To John Morgan (1735–1789) is ascribed the honor of having been the founder of the Medical Department of the University of Pennsylvania. After serving an apprenticeship with Dr. John Redman, Morgan went to London in 1760, where he worked chiefly with William Hunter.[8] Benjamin Franklin, who was residing in London as agent for Pennsylvania, showed him great kindness, introducing him to Fothergill and many other prominent persons. When in the following year Morgan went to Edinburgh, Franklin gave him letters of introduction to Lord Kames and Dr. William Cullen. With the latter Morgan became on very close terms. He talked to him about his plan to found a medical college in Philadelphia, and Cullen probably gave him much valuable advice. Morgan got his M.D. from the University of Edinburgh in 1763[9] and then went to Paris, and later took quite an extensive Continental tour, in the course of which he visited Voltaire at Ferney and had a most interesting interview with that philosopher. Morgan also visited the famous Italian physician, Morgagni, at Bologna, and the latter presented him with a copy of his great work on pathological anatomy, "De Sedibus Morbis."[10] During his stay abroad Morgan was the recipient of many honors. He was made a fellow of the Royal Society, member of the Belles Lettres Society of Rome, associate of the Académie Royal de Chirurgie of Paris and a licentiate of the Royal Colleges of Physicians of both London and Edinburgh.[11] Morgan returned to Philadelphia early in 1765, and at the outset of his career as a practitioner introduced several striking departures from the proceedings in vogue among the physicians of the city. He announced that he had brought over from England a man named David Leighton, who was qualified to practice surgery and pharmacy, and that he would turn over to him all the work of that nature which might be necessary in the course of his practice; or, if his patients wished, they might employ an apothecary or surgeon of their own choice, but that he himself would not dispense medicines, nor do any surgery, and that he also expected to receive his fee at each visit, according to the custom in London. These innovations did not meet the approval of his professional colleagues, and it was not until Dr. Abraham Chovet and, later, Dr. John Jones, followed his example as regards dispensing medicines that it was generally adopted. Another innovation which Morgan is said to have introduced into Philadelphia was the practice of carrying an umbrella. The Reverend Dr. Duche and Dr. Chancellor joined him in appearing on the streets armed with this curious appliance. "Before this some doctors and ministers used an oiled linen cape hooked around their shoulders, looking not unlike the big capecoats now in use, and then called a roquelaure. It was only used for very severe storms."[6] The first umbrellas were made of oiled cloth laid over heavy rattan ribs.

While abroad Morgan had been carefully working over the project of organizing a medical school in connection with the College of Philadelphia, and he submitted his plan to the trustees on May 3, 1765. It was unanimously approved by the Board and Morgan was elected to the professorship of the theory and practice of physic. At the commencement exercises on May 30, 1765, he pronounced his famous "Discourse upon the Institution of Medical Schools in America." Morgan had composed "The Discourse" in London and had submitted it to John Fothergill and William Hunter for their criticisms and suggestions. In it he presents the necessity for a medical school and the advantages to be derived from it, with an outline of the plan for its organization. The "Discourse" was a splendid piece of work and won universal commendation. It shows how thoroughly Morgan was imbued with the Edinburgh tradition and that he planned to place the newly founded medical school on the highest plane. In September, 1765, the trustees appointed William Shippen, Jr., to the professorship of surgery and midwifery in the school, and a little later Kuhn and Rush were added to the faculty.

Things went splendidly until along came the Revolution. Congress appointed Morgan Director-General of the Military Hospitals and Physician-in-Chief to the American Army. Shippen also went into the service, and Benjamin Rush was one of the Signers, and very active in the affairs of Congress, as well as later serving in the Army. I shall not go into details of the public services of any of these men. Suffice it to say that, although Morgan did splendid work under the greatest difficulties, he made enemies by his attempts to introduce proper discipline into the medical department and to correct abuses. In January, 1777, he was summarily dismissed from his position by Congress. He demanded an inquiry and wrote his noble "Vindication" of his conduct. Two years later, a Congressional Committee was appointed to investigate the matter, and its report completely exonerated Morgan. But Morgan never recovered from the blow to his pride and self-esteem. He withdrew from teaching and practice and lived in retirement until his death at the comparatively early age of fifty-three, on October 15, 1789.

Benjamin Rush wrote of Morgan:

> He possessed an uncommon capacity for acquiring knowledge. His memory was extensive and accurate; he was

intimately acquainted with the Greek and Latin classics; had read much in medicine, and in all his pursuits he was persevering and indefatigable. He was capable of friendship, and in his intercourse with his patients discovered the most amiable and exemplary tenderness. I never knew a person who was attended by him that did not speak of him with gratitude and respect.

Morgan was elected physician to the Pennsylvania Hospital in 1773, but he resigned in 1783, owing to a difference of opinion with the Board of Managers over the charging of fees to patients suffering from venereal disease who were sent to the Pennsylvania Hospital from the Philadelphia Almshouse.

Morgan's career ended in bitterness and disappointment, which is all the more sad by contrast with its brilliant beginning. His only writings of note were his "Discourse on the Founding of Medical Schools," and his "Vindication." Curiously enough, he received a prize some years before the Revolution for an essay "On the Reciprocal Advantages of a Permanent Union between Great Britain and the American Colonies."

The second man appointed to a professorship in the medical school of the College of Philadelphia was William Shippen, Jr. (1736–1808). After graduating from the College of New Jersey (Princeton), he began the study of medicine with his father, one of the best-known physicians of his time in Philadelphia. In 1757 the latter sent him abroad to complete his studies. Watson[6] quotes from a letter written by the elder Shippen to an English correspondent, which states so well his reasons for sending his son abroad to study, and lays down such a typical course for him to pursue that I shall quote it. Doubtless the father of many a young man who was sent abroad to finish his education wrote or thought as did Dr. Shippen, Sr.:

> My son has had his education in the best college in this part of the country, and has been studying physic with me, besides which he has had the opportunity of seeing the practice of every gentleman of note in our city. But for the want of that variety of operations and those frequent dissections which are common in older countries, I must send him to Europe. His scheme is to gain all the knowledge he can in anatomy, physic and surgery. He will stay in London for the winter and shall attend Mr. Hunter's anatomical lectures and private dissections, injections, etc., and at the same time go through a course of midwifery with Dr. Smellie; also enter as a pupil in Guy's Hospital. As soon as the season is over, he may go to France and live with Dr. Leese in Rouen, and there study physic until he can pass an examination and take a degree.

Young Shippen went to London accordingly, where he studied anatomy and surgery under William and John Hunter and George McKenzie. He associated much with William Hewson (1739–1774), William Hunter's brilliant young assistant, who made some most remarkable discoveries regarding the lymphatics and the phenomena of the coagulation of the blood, before his premature death at the early age of thirty-five years. Hewson married the daughter of Benjamin Franklin's London landlady, Mrs. Stevenson, and it may be recalled that after his death his widow brought her children over to Philadelphia to live. Perhaps Shippen's friendship for her husband prompted her to take this step, as much as Benjamin Franklin's known advice to her to do so. Shippen went from London to Edinburgh, where he got his M.D. in 1761.[12] Some years later, in 1786, he was elected a Fellow of the Royal College of Physicians of Edinburgh. Before returning to Philadelphia, Shippen travelled in France. As Great Britain was then at war with France, he could not have done this had it not been for the good offices of Sir John Pringle. It appears that there was a wealthy British female who suffered from tuberculosis and wished to go to the south of France. George III personally solicited permission from the French government for her to do so, and they with Gallic chivalry acceeded to his request. Pringle secured Shippen the job of going along as her traveling physician, and in that capacity he had an opportunity of visiting the great French medical school at Montpellier and much else of interest.

Shippen got back to Philadelphia in 1762. While in London he had talked much to Dr. John Fothergill about his plans for giving courses in anatomy and midwifery in his native city, and that generous benefactor to American medicine had been so deeply interested that he had sent over in his care to the Pennsylvania Hospital the set of anatomical drawings and casts to which I have already referred, stating in a letter to the Board of Managers that he understood the difficulty of procuring bodies for dissection:

> In the want of real subjects these will have their Use & I have recommended it to Dr. Shippen to give a Course of Anatomical Lectures to such as may attend. He is very well qualified for the subject & will soon be followed by an able assistant, Dr. Morgan, both of whom I apprehend will not only be useful to the Province in their Employment, but if suitably countenanced by the Legislature will be able to erect a School of Physic amongst you.

Although Dr. Shippen was not elected to the staff of the hospital until 1778, he was allowed the use of the Fothergill pictures and casts in connection with the private teaching courses which he organized, and he used to be present at the hospital on certain days in order to "explain and demonstrate to such persons who are willing to give a Dollar each for the benefit of the Hospital."

In the autumn of 1762 Shippen began giving systematic courses in anatomy, to which some time later he added midwifery. These courses were the first successful effort to give systematic instruction in these subjects in America, and Shippen continued to give them after his appointment as professor in the medical school. This was directly in line with the Edinburgh policy of extramural schools, that is, private schools conducted outside of the University curriculum. During the Revolution, Shippen's courses were necessarily interrupted. After his resignation from the army, Shippen devoted himself to his teaching with renewed ardor and the greatest success. Caspar Wistar in his "Eulogium" of Shippen states that he had as many as four-hundred students in his anatomy class at one time.[13]

In 1779, by an act of legislature, the College of Philadelphia was deprived of its charter and privileges, which were arbitrarily transferred to a new institution created by the legislature with the title of the University of the State of Pennsylvania. Shippen was appointed to the professorship of anatomy, surgery and midwifery in the new school. Ten years later, in 1789, another act of legislature corrected the injustice by restoring its charter and rights to the College of Philadelphia. For several years the two institutions existed, but it was obvious that there was no reason for such a duplication. Accordingly, in 1791, the College of Philadelphia was united with the University of the State of Pennsylvania, to form the University of Pennsylvania. Shippen continued to hold the chair of anatomy, surgery and midwifery in the new institution, with Caspar Wistar, also a graduate of the University of Edinburgh, as his adjunct professor.

In 1798 Shippen sustained a great loss by the death of his son, a young man of great promise, who had, however, been in ill-health for a number of years. According to his colleague and biographer, Caspar Wistar, Shippen never recovered from this blow:

> . . . It cut the sinews of his exertions and left him gradually to wither, the amiable victim of paternal affection. From this time his business as a practitioner declined. He seldom lectured on anatomy, and generally with reluctance, though when he did lecture he always gave the greatest pleasure to his class.

In 1805 Shippen was elected President of the College of Physicians, succeeding John Redman, and the same year he gave up teaching surgery, retaining the chair of midwifery and anatomy until his death on July 11, 1808. Wistar gives a charming little sketch of Shippen's personality when in his prime:

> Nature had been uncommonly bountiful in the form and endowments of Dr. Shippen. His person was graceful, his manners polished, his conversation various, and the tones of his voice singularly sweet and conciliatory. In his intercourse with society he was gay without levity and dignified without haughtiness or austerity. He belonged to a family which was proverbial for good temper. His father, whom he strongly resembled in this respect, during the long life of ninety years, had scarcely ever been seen out of humor. He was particularly agreeable to young people. Known as he was to almost every citizen of Philadelphia, it is probable there was no one who did not wish him well.

The third professor appointed to the medical faculty of the College of Philadelphia was Adam Kuhn (1741–1817). He began his medical studies under his father, who was a physician, and in 1761 went abroad to continue them. Kuhn varied the usual proceedings somewhat by going first to the University of Upsala, Sweden, where he studied especially under the famous botanist Linnaeus. In 1764 he went to London where he remained a year before going to Edinburgh, from which University he received his M.D. on June 12, 1767.[14] Before his return he had travelled also in France, Holland and Germany. Upon his arrival in Philadelphia, in January, 1768, he was appointed professor of materia medica and botany in the medical school of the College of Philadelphia. In 1779 he resigned his chair to become professor of the theory and practice of medicine in the University of the State of Pennsylvania and, after the union of that institution with the College of Philadelphia to form the University of Pennsylvania, he occupied the same chair in the University until his resignation in 1797. Dr. Kuhn was physician to the Pennsylvania Hospital from 1775 to 1798 and was the third President of the College of Physicians, having been elected to succeed William Shippen, Jr., in 1808. His health failed to such a degree that he retired from practice in 1815. Two years later he died, on July 5, 1817. Dr. Kuhn contributed but little to medical literature. Besides his Thesis, his only other publication was a short letter addressed to Dr. John Coakley Lettsom on the diseases following transplantation of the teeth, which was published in the first volume of the *Memoirs of the Medical Society of London*. Of his characteristics we gather from notices written by contemporaries, that though reserved in his common intercourse with mankind, "in the company of his friends no man was more affable and communicative."

> . . . His kind and unassuming behavior to younger physicians, his manners void of ostentation, and his firmness and decision of conduct, will long be remembered. . . . He was distinguished for his extreme devotion to punctuality. Dr. Kuhn was not remarkable for the powers of imagination, but in sound judgement he greatly excelled. His talent for observation was profound. He was through life a studious reader, a lover of music from his youth, remarkably abstemious and regular in his diet, and neat in his person.[15]

The sour Charles Caldwell hated Kuhn, as he did most of his colleagues in Philadelphia. In his Autobiography Caldwell writes of Kuhn:

> He was by far the most highly and minutely furnished specimen of old-school medical production I have ever beheld. His hair, unusually coarse and strong, of which nature had furnished him with an exuberant abundance and given to it so trim and permanent a setting that, at the age of seventy-five, he possessed, perhaps, as much of it as he did at that of twenty-five; that appendage of the head his hairdresser so arranged as to give it the resemblance of a fashionable wig, well pomatumed, stifly curled and richly powdered. His hand- and bosom-ruffles were full and flowing, his breeches were black, his long-skirted waistcoat white or buff and his coat snuff-colored. In his hand he carried a gold-headed cane, in his waistcoat pocket a gold snuff-box, and his knee- and shoe-buckles were of the same metal. . . . He entered each sick-room at a given time, spent a given number of minutes in examining and prescribing and never suffered the slightest deviation to be made from his directions. Weak sage-tea was a favorite beverage, which he often prescribed as a drink for the sick. If, as was sometimes the case, the kind nurse or attendant took the liberty of saying to him as he was moving toward the door to make his exit from the room. "Doctor, should the patient want to drink a little toast-water or lemonade, I suppose I may give it to him?" he would turn and reply, with oracular solemnity and decisiveness: "I have directed, or I have said, weak sage-tea. Good morning, madam."

His lectures, Caldwell charges, were merely a rehash of those of Cullen. This bitter criticism was written in spite of the fact that when Caldwell had been very ill he sought Kuhn's professional services and had been visited by him thrice daily and he had to acknowledge his skill and success as a practitioner.

One cannot hope to do justice to such a great man as Benjamin Rush (1745–1813), the fourth man elected to a professorship in the Medical School of the College of Philadelphia, in a thumbnail sketch. His achievements were too many and too various. The great pity is that, as yet, there has been no adequate biography written of this great physician, educator, scholar and statesman. After graduating from Princeton, Rush served an apprenticeship with Dr. John Redman and was one of the students who attended Shippen's first course on anatomy. His apprenticeship finished, he went abroad and, on June 1, 1768, received his M.D. from the University of Edinburgh.[16] I am indebted to Dr. J. Gordon Wilson, of Chicago, for directing my attention to an interesting correspondence in *Notes and Queries*, volumes IX and X, 1854. It quotes the following from the Records of the Town Council of Edinburgh: "March 4, 1767. The Council admits and receives Richard Stocktoun (*sic.*), Esq., of New Jersey, and Benjamin Rush, Esq., of Philadelphia, to be burgesses and gild brothers of this city in the most ample form." No reason is given why such an honor should have been conferred on the two young Americans.[17]

The winter following his graduation was spent in London, with a sojourn in Paris. Returning to Philadelphia in 1769, he was elected professor of chemistry in the College of Philadelphia. When Dr. Kuhn resigned from the College, Dr. Rush succeeded him as professor of the theory and practice of medicine. After the formation of the University of Pennsylvania he was elected professor of the institutes of medicine and of clinical medicine in the new University. He was elected one of the physicians to the Pennsylvania Hospital in 1783, and he fulfilled his duties to the Hospital and the University with the most absolute regularity until his death in 1813. It should be remembered that he was a Signer of the Declaration of Independence, a very active member of the Continental Congress and during the Revolution he served as physician general in the Continental Army. From 1799 to 1813 he was treasurer of the mint of the United States. He was active in many benevolent and other public movements, particularly that for the abolition of slavery, temperance reform and the abolition of capital punishment. He was the chief factor in the founding of Dickinson College and a book has been published recently devoted entirely to his services to education.[18]

I cannot refer more than very briefly to Rush's wonderful services during the epidemics of yellow fever which devastated Philadelphia in 1793, 1794, 1797, 1798 and 1803. He had witnessed a previous epidemic while a student in 1762. Throughout these terrible times he stayed at his post, saw more patients than any other physician in the city, and was more successful in the treatment of his cases. At first he believed the disease was contagious, but later he changed his views and held that it was not. He believed that it was of domestic origin and not imported by ships from Southern ports. In this he differed from the opinion of the majority of the Fellows of the College of Physicians. This led to his resignation from this body and to the formation of the short-lived Philadelphia Academy of Medicine by those of his colleagues who adhered to his opinion. It is hard for us to realize the bitterness which was engendered in those days by differences of views on purely scientific or professional matters. Rush relied chiefly on copious bleeding and large doses of calomel in his treatment of yellow fever and he certainly was, as before said, more successful with his patients than most of his colleagues.

They heaped ridicule on his methods. He used to give what he termed his "ten-and-ten" powder, containing 10 grains of calomel and 10 grains of jalap, frequently repeated, and he spoke of calomel as his "Samson" because of its power against yellow fever; but the wags said it should be called so because of the numbers it had slain. They also referred to him continually as Dr. Sangrado, after the famous bleeder in "Gil Blas." Rush suffered an attack of yellow fever himself and attributed his recovery to the copious bleeding and large doses of calomel to which he was subjected.

Rush was the pioneer American alienist. He advocated the treatment of insanity as a disease and the management of its victims with humanity. He was able to put his enlightened views in practice at the Pennsylvania Hospital, where he developed an excellent service for the mentally disordered. His writings fill many volumes and contain much of permanent value. Rush was a profoundly religious man. He took an active part in founding the Bible Society and was a strong advocate of daily Bible-reading in the public schools. His friend and eulogist, Dr. Francis, of New York, wrote:

> Those who had the happiness to experience the delights of his conversation will long recollect with pleasure, his unassuming modesty, and the rich stores of knowledge he poured forth on the most instinctive topics, even when his opinions were solicited, not as the dictates or admonitions of a superior but as the kind advice of a friend and equal. He never evinced any of that haughtiness and affectation of importance which sometimes attach to men of eminence, and which so materially lessens the pleasures and comforts of social life.

The four Edinburgh graduates of whose careers I have given you a brief outline made up the first full faculty of the medical school of the College of Philadelphia. In addition we have seen that, in accordance with the custom at Edinburgh, extramural courses were given on anatomy and midwifery by William Shippen, Jr., and, besides these, extramural courses on clinical medicine were given at the Pennsylvania Hospital by Thomas Bond, who had studied at Edinburgh, although he did not remain there to receive his degree. The medical faculty as thus organized continued practically unchanged until the temporary disruption of the College of Philadelphia. Shortly after its reorganization as the University of Pennsylvania two other graduates of the University of Edinburgh became members of the faculty, who maintained the Edinburgh tradition with great effect for many years. These two men were Philip Syng Physick and Caspar Wistar.

Philip Syng Physick (1768–1837) has been justly honored with the title of "Father of American Surgery." He graduated from the collegiate department of the University of Pennsylvania in 1785. It is related by his son-in-law and biographer, Dr. Jacob Randolph, that it was probably due to his father's urging that young Physick undertook the study of medicine. One day Mr. Physick cut his finger very severely and his son showed so much aptitude in dressing the injury that he "determined in his mind to make him a surgeon." Randolph supplements this story with the curious statement:

> I feel compelled to confess that I do not think Dr. Physick himself could

support pain with the same degree of fortitude and composure which we have sometimes met with in persons who suffered to an equal extent with himself; it is undeniable, however, that he was extremely unwilling to be the source of inflicting pain upon others.

Physick began the study of medicine under Dr. Adam Kuhn, and soon after manifested his susceptibility in this direction. Dr. Kuhn wished him to witness an amputation which was to be performed at the Pennsylvania Hospital, "but understanding perfectly well the peculiar temperament of his pupil, he gave it as his advice that his father should go with him, and fortunately too, inasmuch as his son became so sick during the operation that it was necessary to lead him from the amphitheatre before it was concluded." A curious beginning, indeed, for the career of a great surgeon. While studying with Kuhn, Physick also attended the medical lectures at the University of Pennsylvania, but did not try for a degree, as at the end of three years' study he sailed for England, accompanied by his father. They arrived in London in January, 1789. Young Physick was accepted by John Hunter as a house pupil, and for one year he worked hard at anatomy and surgery under the greatest teacher of his time. He was a great favorite with Hunter, who, January, 1, 1790, secured for him the position of house surgeon at St. George's Hospital. This much coveted appointment is a token of the favorable impression the young man must have made on Hunter. There were many applicants and it was a great triumph to have received it. At the expiration of his year's term of service, in January, 1791, Physick received his diploma from the Corporation of Surgeons of London.

Hunter wished Physick to remain with him as his assistant, but Physick declined this flattering offer, although he lived in Hunter's house and helped him in his work from January until May, 1791, when he left London for Edinburgh. One year later, May, 1792, he received his M.D. from that University.[19] He remained in Edinburgh a few months, working at anatomy and surgery. In September, 1792, he returned to Philadelphia and started to practice. In the subsequent year, 1793, Philadelphia suffered from a terrible epidemic of yellow fever. Physick served as physician to the hospital at Bush Hill, and in that capacity showed the greatest skill and bravery, by which he won the lasting esteem and friendship of Stephen Girard. Physick suffered an attack of the disease himself and had it again in 1797. In 1798 he again acted as resident physician at Bush Hill Hospital. He was a devoted follower of Benjamin Rush, believing yellow fever to be of domestic origin, and non-contagious. As has been mentioned, Rush resigned from the College of Physicians of Philadelphia because that body had issued a statement in which it was maintained that yellow fever was imported into the city by ships and not of domestic origin. Because of his devotion to Rush and adherence to his views, Physick never became a Fellow of the College.

Physick was elected to the staff of the Pennsylvania Hospital in 1794 and served until 1816. In 1800, at the request of a number of medical students at the University of Pennsylvania, Physick began giving private lectures on surgery. Six years later

(1806) he was elected professor of surgery in the University. This chair he held until 1819, when he was transferred to that of anatomy, which he resigned in 1831. Dr. Randolph says:

> Dr. Physick's manner as a public lecturer was grave, dignified and impressive to an extraordinary degree. His style was clear and comprehensive, simple yet chaste. He was uniformly careful never to say too much. His choice of language was remarkably good, and he possessed the happy faculty of communicating knowledge agreeably and well in as great perfection as any other man I have ever heard lecture. . . . His lectures were all carefully prepared and written out.

Physick never wrote a book and made but few contributions to medical literature, but those of great importance. He was president of the Phrenological Society of Philadelphia in 1822.

Some of Dr. Physick's most important work may be briefly noticed. Physick was especially expert in the treatment of fractures and dislocations, devising a number of very useful splints and dressings for them. In ununited fractures he achieved much success by using a seton passed between the fragments. He devised a curved bistoury for use in operations for fistula in ano, and originated an operation for the cure of artificial anus which was much superior to any heretofore known. In the *Eclectic Repertory*, October, 1812, he reported two cases in which he washed out the stomachs of children who had swallowed laudanum. These are the first instances in which lavage was practiced for the purpose of removing poison from the stomach. At the time Dr. Physick was ignorant of the fact that lavage in such cases had been suggested by Alexander Monro, *secundus*, in his Inaugural Thesis in 1797. Monro had, however, never used it. Physick published a note in a subsequent issue of the *Eclectic Repertory*, stating that since his previous report he had read Monro's suggestion and hastened to give him credit for it.

In Physick's time it was customary to use silk or flax for ligating blood vessels. These substances were not absorbable and consequently remained in wounds for weeks or months and, acting as foreign bodies, kept the wound from healing and caused prolonged suppuration. Physick wished to obviate these disadvantages and undertook a series of experiments with animal substances, as a result of which he used the latter entirely from 1816 onwards.[20]

In 1820[21] Physick published a method for the removal of scirrhous tonsils and hemorrhoids by means of a double cannula and soft wire. A few years later[22] he described a guillotine for the excision of the uvula, of which he had devised a modification for the excision of the tonsils, and subsequently[23] he described a vulsellum forceps to grasp the tonsils in performing the operation. These instruments constitute the original models on which all the modern instruments for this purpose were designed.

In former days skill in operations upon the eyes was frequently associated with similar ability in operating for stone in the bladder. Cheselden, the great English surgeon of the eighteenth century, possessed great fame in both these branches, and the same may be said of Physick. I will conclude my account of his achievements by the brief mention of two cases illustrating this point. In October, 1831, when Physick was sixty-three years old, he performed the operation of lithotomy on Chief Justice John Marshall, aged seventy-five, removing no less than 1000 calculi from the bladder of his distinguished patient. John Marshall died four years later of some hepatic complaint. At the autopsy his bladder was found absolutely free from calculi or any form of disease. The last operation performed by Dr. Physick was for cataract on a foreigner upon whom Physick had operated a year before. The patient had waited in Philadelphia a whole year for the second operation and Physick, though in wretched health and quite feeble performed the operation rather than disappoint him. Randolph says: "The date on which he performed this operation was the 13th of August, 1837. I was present on the occasion, and watched him with the most intense anxiety. He was quite collected and firm, and his hand was steady, notwithstanding at the time he was laboring under great mental and physical suffering." Physick suffered from hydrothorax, which was so bad that he could not lie down to sleep. He developed a general anasarca and died after much suffering on December 15, 1837.

Apropos of the death of Physick one may recall a story told by Randolph: On the evening of the day Dr. Rush was buried Dr. Physick's doorbell was rung and he answered the summons himself. In the doorway stood a burly negro who demanded, "Do you want Dr. Rush?" "What do you mean," said Physick, "Dr. Rush is dead!" "I will have him at the College for you at nine o'clock tomorrow morning, for twenty dollars," said the negro. Of course, the offer was not accepted, but Physick was so shocked that he took precautions that after his death his grave should be guarded against the possibility of his resurrection.

The last of the Edinburgh graduates who were on the faculty of the University of Pennsylvania of whom I shall speak was the distinguished Caspar Wistar (1761–1818). Carson points out that as he had begun his medical studies in 1777 in the medical school of the College of Philadelphia and he graduated in 1782 from the University of the State of Pennsylvania, it was very natural that he should have been most active in the steps leading to the union of the two to form the University of Pennsylvania. Wistar began his medical studies with John Redman and the famous surgeon John Jones. After graduating from the medical school of the University of the State of Pennsylvania he went abroad and got his M.D. from Edinburgh in 1786.[24] While in Edinburgh he was elected President of the Edinburgh Medical Society, a great compliment to an American, particularly so soon after the Revolution; but Wistar's whole career indicates what a very delightful and popular man he must have been.

In 1789 he became trustee of the College of Philadelphia and soon after professor of chemistry. In 1792 he was elected Shippen's adjunct professor in the chair of anatomy. Wistar was an able teacher. He had a great number of specimens and models prepared for the use of his students, many of the models having been prepared by Rush, the most skillful woodcarver of his day. At his death he bequeathed his large collection of preparations and models to the

University, where they formed the nucleus of the great Wistar Museum, which is such a notable feature in the University's activities at the present day. Wistar made some very notable contributions to the correct knowledge of the anatomy of the sphenoid and ethmoid bones. His "System of Anatomy," published in 1811, was the first American book of its kind and was held in just esteem for many years. Wistar was also an excellent botanist and geologist. The beautiful Wisteria plant was named after him by the Abbé Correa da Serra. In 1815 he succeeded Thomas Jefferson as president of the American Philosophical Society. During his life Wistar used to keep a sort of open house on Sunday evenings for his scientific friends and any scientific strangers who might be visiting Philadelphia. Upon his death some of his friends in the American Philosophical Society decided to continue holding somewhat similar social gatherings on Saturday evenings, and thus arose the famous "Wistar Parties," which form such a feature in Philadelphia's social life to the present day, a unique monument to the hospitable nature of a great man.

And now it is appropriate that I should close this Oration with a reference to the relationship that these men who had received such excellent training and shown such splendid results held to this our College of Physicians.

I shall begin with another quotation from Dr. Mitchell's beautiful address at its Centennial:

> On the 2nd of January, 1787, in the evening, in a little house used by the University and known as Surgeon's Hall, on Fifth Street, south of Library, assembled a portion of the notable group of men who then constituted this College. By the dim light of candles, for which I have found the modest bill, clad after the fashion of the day, some in Quaker dress and some in knee breeches, silk stockings, and low shoes with buckles, most of them carrying, I fancy, the gold-headed cane and the meditative snuff-box, some with queues or powdered wigs, a fading fashion, were John Jones, William Shippen, Jr., Adam Kuhn, Benjamin Rush, Thomas Parke, Gerardus Clarkson, Samuel Duffield, James Hutchinson, William W. Smith, Andrew Ross, William Clarkson, James Hall, William Currie. The full roll of Fellows and Junior Fellows in January, 1787, adds the names of John Redman, John Morgan, George Glentworth, Abraham Chovet, Benjamin Say, Samuel Powel Griffits, Benjamin Duffield, John Morris, John Carson, John Foulke, Robert Harris.

It seems to me I feel the thrill of pleasure that inspired Dr. Mitchell when he read this roll of twenty-four distinguished names.

Of the eleven Senior Fellows four were graduates in medicine from the University of Edinburgh, namely, William Shippen, Jr., John Morgan, Adam Kuhn and Benjamin Rush.

The following three Senior Fellows had studied at Edinburgh but for various reasons had not got their degrees from that University: John Redman, the first President of the College, graduated M.D. at Leyden in 1748; John Jones received his M.D. at Rheims in 1757; Thomas Parke studied in both London and Edinburgh, but was content throughout his professional life with the degree of Bachelor of Medicine, which he received from the College of Philadelphia in 1770.[25] Thus seven of the eleven were Edinburgh men.

The first Secretary of the College, James Hutchinson, had gone to England and begun his studies under the auspices of Dr. John Fothergill, but had been compelled to return to America because of the outbreak of hostilities between the Colonies and Great Britain. On his return voyage he had been entrusted by Benjamin Franklin with important papers for Congress. When off the American coast his ship was pursued by a British warship. Hutchinson threw himself into a small boat and got ashore under heavy fire. The ship was captured and he lost all his personal belongings but he had saved his dispatches.

Fellows of the College and guests: These were the men whose traditions we have inherited, and no one better exemplified their importance and true worth than our great Fellow, Weir Mitchell. His many-sided career presents many points of resemblance to that of Benjamin Rush. Both were not only great physicians, but also were especially distinguished as students and teachers of neurology. Both were interested in much outside of their strictly professional activities, were animated by ardent zeal for the welfare of their fellowmen, proud of their profession and jealous of its dignity. How much this College owes to Weir Mitchell can never be adequately expressed, but the greatest debt of all is probably that we owe to his zeal for the preservation of the highest professional ideals which he received from his predecessors and maintained throughout his life.

References

1. Burr, A. R. Weir Mitchell, His Life and Letters. Phila., 1929.
2. According to J. D. Comrie: The History of Scottish Medicine to 1860, London, 1927, the Medical Society of Edinburgh came into existence in 1734.
3. Wilson, J. G. President's Address to the Institute of Medicine of Chicago, Dec. 4, 1928. Reprinted from *Proc. Inst. Med. Chicago*, vol. 7, February, 1929.
4. Comrie, J. D. History of Scottish Medicine to 1860. London, 1927.
5. The letter is reproduced by Dr. William Pepper in his most excellent series of articles on "The Medical side of Benjamin Franklin," which were published in the University of Pennsylvania Medical Bulletin in 1910: "I suppose your son Richard will spend some time in London, where, by what I have heard, Physic and Surgery may be studied to as great advantage as in any Part of the World, by Attending the Anatomical Lectures and Hospitals, conversing with the most eminent Practitioners, and Reading under their Advice and Direction; and yet the general run is at present to Edinburgh; there being at the Opening of the schools, when I was there in November last, a much greater number of medical Students than had ever been known before. They have indeed a Set of Able Professors in the several Branches, if common Opinion may be rely'd on. I who am no Judge in that Science, can only say that I found them very sensible Men, and agreeable Companions. I will endeavor to obtain Sir John Pringle's Advice in the Affair, as you desire. Every Wednesday evening he admits young Physicians and Surgeons to a Conversation at his House, which is thought very improving to them. I will endeavor to introduce your Son there when he comes to London. And to tell you frankly my Opinion, I suspect there is more valuable knowledge in Physic to be learnt from the honest candid Observations of an old Practitioner, who is past all desire of more Business, having made his Fortune, who has none of the Professional Interest in keeping up a Parade of Science to draw Pupils, and who by Experience has discovered the Inefficacy of most Remedies and Modes of Practice, than from all the formal

Lectures of all the Universities upon Earth. I like therefore a Physician's breeding his Son to Medicine, and wish the Art to be continued with the Race, as thinking that must be upon the whole most for the Publick Welfare."

6. WATSON J. F. ANNALS of Philadelphia etc., Phila., 1844.
7. CARSON, J. History of the Medical Department of the University of Pennsylvania. Phila., 1869.
8. John Hunter received his commission as surgeon in the Army in 1759, and must have been absent on the expedition to Belle Isle during much of the period of John Morgan's stay in London, or if he had returned he had not resumed teaching.
9. Morgan's thesis was entitled "De Puopoisei." In it he maintained that pus was a secretion from the inner walls of the blood vessels, a view subsequently put forth by John Hunter and usually spoken of as original with him. There is no doubt, however, of Morgan's priority, though Hunter was not aware of Morgan's views when he published his own.
10. This book was presented to the College of Physicians of Philadelphia by Morgan. It bears the following inscription written by Morgagni on the title-page of each volume. Inscription in Volume 1: "Viro Experientissimo et Humanissimo D. D. Joanni Morgan, Auctor." For the second Volume: "Viro de Re Anatomia bene merito D. D. Joanni Morgan, Auctor."

    As will be seen, there is nothing in this inscription to bear out the oft-repeated assertion that Morgagni wrote a punning Latin inscription approximating Morgan's name to his own, and addressing him as his son.
11. Morgan's Journal which he kept during his travels on the Continent was printed for private circulation by Colonel A. S. Morgan, in 1912. It is a most interesting little book.
12. Shippen's Thesis was entitled "De Placentae cum Utero Nexu."
13. Dr. G. W. Norris in his "Early History of Medicine in Philadelphia" (Phila., 1886) gives the maximum number of students as two hundred.
14. His Thesis, "De Lavatione Frigida," was dedicated to Linnaeus.
15. Thacher in his "American Medical Biography" quotes most of this account of Kuhn from the *Eclectic Repository*, vol. 8.
16. Rush's Thesis, "De Coctione Ciborum in Ventriculo," was especially remarked for the elegance of the Latin in which it was written.
17. *Notes and Queries* also contains the following: "Benjamin Rush. In answer to 'Inquirer' I am tempted to send the following extract from a recently discovered letter from Dr. Rush to a friend in Philadelphia, describing a very peculiar method of presenting the freedom of the city to strangers which prevailed in Edinburgh ninety years ago and to which allusion is made by some of the English novelists of the last century. I have heard that the usage prevails to this day in Rome, Naples and other Italian cities. The letter from which I quote is dated December 29, 1784:

    "Edinburgh is built upon one-third less ground than Philadelphia, but contains double the number of inhabitants. I think they compute eighty thousand souls in the city. The reason why they occupy so much less room is owing to the height of their houses, in each of which seven or eight families reside. There is one common pair of steps which communicate with all the rooms of the house. These steps are open and exposed, and are trod by everybody in the same manner as the public streets. Dr. Franklin called them, some years ago when in Scotland, upon this account, perpendicular streets. The inhabitants, although they live together in their human hives, are entire strangers to (one) another. There is a family living above me and another immediately below me, and yet I know no more of their names or persons than you do. This way of living subjects the inhabitants to many inconveniences, for, as they have no yards or cellars, they have of course no necessary houses and all their filth of every kind is thrown out of their windows. This is done in the night generally, and is carried away next morning by carts appointed for that purpose. Unhappy they who are obliged to walk out after 10 or 11 o'clock at night. It is no uncommon thing to receive what Juvenal says he did, in his first satire, from a window in Rome. This is called here being *naturalized.* As yet I have happily escaped being made a freeman of the city in this way, but my unfortunate friend Potts has gained the honour before me."

18. Good, H. G. Benjamin Rush and his Service to Education, Berne, Ind., 1915.
19. His Thesis, "De Apoplexia," was dedicated to John Hunter.
20. *Eclectic Repository*, vol. VI, 1816. The idea of the use of animal material for ligatures had been suggested previously by others, but Physick was ignorant of this when he conducted his experiments, and the latter were entirely original in idea and method with him.
21. *Phila. J. Med. & Phys. Sciences*, vol. 1, 1820.
22. *Am. J. M. Sc.*, vol. 1.
23. *Am. J. M. Sc.*, vol. 2.
24. His Thesis was entitled "De Animo Demisso."
25. Gerardus Clarkson studied abroad "for a prolonged period" but I cannot ascertain where.

WASHINGTON'S LAST ILLNESS*

By FIELDING O. LEWIS, M.D.

PHILADELPHIA

ONE hundred and thirty-two years have elapsed since the death of George Washington in his sixty-eighth year.

He had retired from the activities of a public life to enjoy the comforts of his beautiful estate, Mt. Vernon, and had assumed the role of a real dirt farmer. Irving states:

> He was an early riser, often before day break in the Winters when the nights were long, on such occasions, he lit his own fire and wrote and read by candle light. He breakfasted at seven in Summer and eight in Winter. Two small cups of tea and three or four cakes of Indian Meal formed his frugal repast. Immediately after breakfast, he mounted his horse and visited those parts of his estate where any work was going on, seeing to everything with his own eyes and often aiding with his own hands.

This assiduousness was the contributing factor in his last illness, as evidenced by his devoted secretary, Col. Tobias Lear, who stated that Washington on December 12, 1799, two days before his death, "rode abroad on his plantation, from ten o'clock in the morning until three o'clock in the afternoon and the weather was very bad, rain, hail, and snow falling alternately, with a cold wind." He observed on his return, "That his neck appeared wet and that snow was hanging upon his hair, and that no change of clothing was made before dinner. On the following morning, Friday, he complained of a sore throat and remained indoors, but in the afternoon ventured out in the snow to mark some trees which he wished felled; upon his return it was noticed that he had developed a hoarseness, which increased in the evening, but he made light of it. He spent the evening reading the papers and when he met anything interesting, he read it as loud as his hoarseness would permit." When Col. Lear suggested that he take some medicine for his cold, he replied: "No, you know I never take anything for a cold. Let it go as it came," which suggests to my mind, that besides being a great soldier, patriot, and statesman, he also had some instincts of a physician.

Two of his physicians, Doctors James Craik and Elisha C. Dick, published a very clear and concise statement of their illustrious patient's illness, which appeared in the *Times* of Alexandria, Va., December 19, 1799.

> Messrs. J. and D. Westcott.
>
> Presuming that some account of the late illness and death of General Washington will be generally interesting, and particularly so to the Professors and Practitioners of Medicine throughout America, we request you to publish the following statement.
>
> Some time in the night of Friday, the 13th inst., having been exposed to rain on the preceding day, General Washington was attacked with an inflammatory affection of the upper part of the windpipe, called in technical language, cynanche trachealis. The disease commenced with a violent ague, accompanied with some pain in the upper and fore

---

* Read before the Historical Section of the College of Physicians, Philadelphia, Feb. 8, 1932.

part of the throat, a sense of stricture in the same part, a cough, and a difficult rather than painful deglutition, which were soon succeeded by fever and a quick and laborious respiration. The necessity of blood-letting suggesting itself to the General, he procured a bleeder in the neighborhood, who took from the arm in the night, twelve or fourteen ounces of blood; he would not by any means be prevailed upon by the family to send for the attending physician till the following morning, who arrived at Mount Vernon at eleven o'clock on Saturday morning. Discovering the case to be highly alarming and foreseeing the fatal tendency of the disease, two consulting physicians were immediately sent for, who arrived, one at half past three and the other at four in the afternoon. In the interim were employed two copious bleedings; a blister was applied to the part affected, two moderate doses of calomel were given, an injection was administered which operated on the lower intestines, but all without any perceptible advantage, the respiration becoming still more difficult and distressing. Upon the arrival of the first of the consulting physicians, it was agreed, as there were yet no signs of accumulation in the bronchial vessels of the lungs, to try the result of another bleeding, when about thirty-two ounces were drawn, without the smallest apparent alleviation of the disease. Vapours of vinegar and water were frequently inhaled, ten grains of calomel were given, succeeded by repeated doses of emetic tartar, amounting in all to five or six grains, with no other effect than a copious discharge from the bowels. The powers of life seemed now manifestly yielding to the force of the disorder. Blisters were applied to the extremities, together with a cataplasm of bran and vinegar to the throat. Speaking, which was painful from the beginning, now became almost impracticable, respiration grew more and more contracted and imperfect, till half after eleven o'clock on Saturday night, when, retaining the full possession of his intellect, he expired without struggle.

He was fully impressed at the beginning of his complaint as well as through every succeeding stage of it, that its conclusion would be fatal, submitting to the several exertions made for his recovery, rather as a duty than from any expectation of their efficacy. He considered the operation of death upon his system as coeval with the disease; and several hours before his decease, after repeated efforts to be understood, succeeded in expressing a desire that he might be permitted to die without interruption.

During the short period of his illness he economized his time in the arrangement of such few concerns as required his attention, with the utmost serenity, and anticipated his approaching dissolution with every demonstration of that equanimity for which his whole life has been so uniformly and singularly conspicuous.

James Craik	Elisha C. Dick
Attending physician	Consulting physician

The signature of Doctor Gustavus Brown, of Port Tobacco, who attended as consulting physician, on account of the remoteness of his residence from the place, has not been procured to the foregoing.

Since this publication in 1799, there has been much conjecture as to the true disease which caused his death and much bitter criticism as to the methods that were employed in the treatment. Two of his physicians were of Scotch parentage and both were graduates of Edinburgh. Dr. Dick was an American and a graduate of the University of Pennsylvania. I can, therefore, well imagine that before issuing their historic report, that they probably consulted the writings of William Cullen, who was then Professor of Medicine at Edinburgh, for confirmation of their diagnosis. In a publication by Cullen in 1778, it is stated that cynanche trachealis is "An inflammation of the glottis, larynx or upper part of the trachea. . . known by a peculiar croaking sound in the voice, by difficult respiration, with a sense of straightening about the larynx and by an attending pyrexia—and frequently produces such an obstruction of air as suffocates and thereby proves suddenly fatal."

Was their diagnosis correct? In my opinion, it was justified, if one considers the nomenclature of their day, and if one considers that they had no means by which the larynx could be visualized and that little was known about the diseases of the larynx until 1855, when Manuel Gascia invented the laryngoscope. In looking over the publications on this topic, one is somewhat bewildered to find such a difference of opinions as to the disease which caused Washington's death.

Among the diseases mentioned besides cynanche trachealis, are acute laryngitis, quinzy, laryngeal diphtheria, inflammatory edema of the larynx, cardiorenal disease, Ludwig's and Vincent's angina. To these I shall add still another opinion.

Let us briefly analyze the sequence of events which preceded his last illness and the symptoms as related by his attending physicians.

Washington is described as being a large, well-proportioned man and in appearance hale and hearty, but as Dr. W. B. Blanton states, "as a matter of fact he was not the robust man he was popularly thought to be. He had a bad inheritance. His paternal forefathers were short lived and there was a marked tendency to pulmonary disease among his ancestors." He frequently suffered from colds, had several attacks of dysentery, was thought to have had measles, pneumonia and pleurisy and a few weeks after becoming President, he was critically ill from a carbuncle located on the thigh. His teeth were evidently bad, for he frequently consulted dentists until they were all extracted and replaced by artificial dentures. It is, I think fair to assume that he was an epicure, for who could resist the cuisine of a Southern home? It is recorded that during the last two years of his life, his health was much impaired, all of which would indicate that he probably had a high blood pressure associated with cardiorenal changes which predisposed him to infection at the time of his exposure as afore mentioned. The first symptom of which he complained was a sore throat, which appeared on the morning following his exposure. In the afternoon of the same day hoarseness developed followed during the night by a violent chill accompanied with some pain in the throat. The next day, Saturday, breathing and swallowing became increasingly difficult. There was fever and the respiration was quick and laborious, in other words, I assume from this statement there was probably retraction of the intercostal spaces and suprasternal notch, which are pathognomonic signs of laryngeal stenosis. The lungs were clear, no mention is made of a throat examination having been made. From the history and symptoms attainable it is my belief that the immediate cause of death was an acute edema of the larynx, secondary to a septic sore throat of a probable streptococci variety.

Washington's sudden death was a tremendous shock to the whole country and was followed by a wave of criticism directed against the medical profession. The lay critics ascribed his death to the loss of blood from the repeated use of the lancet. Ford in his "True Washington" says, "There can scarcely be a doubt that the treatment of his last illness by the Doctors was little less than murder."

Phlebotomy in Washington's time was the accepted form of treatment for all inflammatory conditions about the throat as were also inhalations, free elimination, and external applications in the form of counterirritants.

Dr. Brown, in a letter concerning the treatment written to Dr. Craik a few weeks after Washington's death, said: "We were governed by the best light we had; we thought we were right and so we were justified." With the standards of medical knowledge as they were in the days of Dr. Brown, what more could any one have done?

With the cardinal signs of laryngeal obstruction apparently present, it seems to me most unfortunate that tracheotomy, which was known at that time, was not more universally taught and practiced. Had Washington's physicians been familiar with its procedure, what a wonderful opportunity it would have been, if successful, to have immortalized a life-saving operation; it would have no doubt been the stimulus for the saving of many other lives; which today after two hundred years is too frequently neglected.

On his deathbed as in battle George Washington was fearless. To Dr. Craik he said: "Doctor I die hard; but I am not afraid to go. I believed from my first attack that I should not survive it; my breath cannot last long." Thus without a struggle came the end of an illustrious life.

REFERENCES

Medical Repository, New York, vol. 3, p. 311, 1799. Printed by Swords.

JACKSON, J. Memoir of the last Sickness of General Washington. Pamphlet, Boston. Privately printed, 1860.

COHEN, S. S. Washington's Death and the Doctors. *Lippincott's Monthly Mag.* Phila., v. 64, p. 945–952, 1899.

BLANTON, W. B. Medicine in Virginia in the Eighteenth Century. Richmond, Garrett & Massie, p. 307–310, 1931.

BRINTON, W. Observations of the Medical Treatment of General Washington in his Illness. *Tr. Coll. Phys., Phila.*, 3s., v. 25, p. 90, 1903.

WELLS, W. A. Last illness and death of Washington. *Virginia M. Monthly*, vol. 53, p. 629, January, 1927.

THE LIFE AND TIMES OF DR. WILLIAM HARVEY*

By SIR WILMOT HERRINGHAM, K.C.M.G., C.B., M.D., F.R.C.P.

HAMPSTEAD, ENGLAND

PART II*

III. HARVEY FROM 1600 TO 1628

On leaving Cambridge Harvey went to Padua to complete his medical studies. He there appears as D. Gulielmus Arveius, Anglus, first in the list of the English students in the Universitas Juristarum for 1600. There was also at Padua a Universitas Artistarum (Universitas in medieval Latin was used of any club association or corporation), including the faculties of divinity, medicine and philosophy, to which Harvey would more properly have belonged, but the Jurists' Universitas was the more fashionable of the two. The entry is repeated in 1601, and there is also a record on August 1, 1600, 1601, and 1602 that Harvey was elected Member of Council (*Conciliarius*) of the English nation in the same association, so that though he took his degree April 25, 1602, he appears to have remained at Padua at any rate until August.

Padua had been during the 16th century, the chief center of anatomical research and teaching. Vesalius, Eustachius, Columbus, Falloppius and Fabricius, who by dissection of the human body, which was unknown to Galen, had laid afresh the foundation of human anatomy, were all professors at Padua, and English physicians beginning with Caius, who lived in the same house with Vesalius, and Linacre, resorted thither to learn medicine, and commonly took the Paduan M.D. In the 17th century the religious difficulty made it harder for Englishmen to study in Italy, and the Dutch schools rose to the first place.

Harvey's master in anatomy, of whom he always speaks in terms of the highest veneration, was Fabricius da Aquapendente. Galileo was lecturing to immense audiences when Harvey was there, but Fabricius' theater, which is still in existence, is a small area surrounded by a steep series of steps on which the students stood and looked down upon the dissection beneath, much as fifty years ago students looked down on operations in some surgical theaters at our London schools.

Harvey's diploma, which is preserved at the College of Physicians, is couched in very florid language, and has sometimes been quoted as a proof of his early excellence, but, judging from other diplomas, it was the language ordinarily used. It bears at the top of the first page "an oval shield gules a dexter sleeved arm and hand issuant from the sinister side, sustaining pale-wise a candle lighted argent with rays or issuant from the flame and entwined by two serpents of the second."[12] This shield is painted twice in the lower cloister at Padua, and is reproduced also in the portrait of Harvey at Ditchingham, where it is accompanied by the motto *Piu arde piu splende*, "The more it burns, the more it shines." A copy also hangs in the library of the College of Physicians.

In 1602, Harvey returned to England, incorporated M.D. at Cambridge, and settled in St. Martin's, Ludgate.

---

*Part I of this article appeared in the March, 1932 issue of the ANNALS OF MEDICAL HISTORY, vol. IV, No. 2, p. 109.

To his early years belongs the following record; perhaps to 1604.[13]

> To the Right Honourable Sir Thomas Lowe Knight.
>
> Whereas it hath pleased His Majesty to direct his privy seal to William Harvey doctor of physic for to borrow of him six pounds and thirteen shillings and fourpence we whose names are underwritten do certify unto you that the said Doctor Harvey is a young man whose father is yet living and that being to begin the world and to live by his profession his means and abilities are such as in our judgment he is unfit to lend.
>
> Robert Shawe
> [Signature illegible]
> Ric. Mapes.
> Adam [illegible]
> Joseph Fenton
> Richard Coop
> Edw. Grayne
> Henry Warden.
>
> [These persons who are unknown were probably neighbors.]

He was admitted a Candidate, which corresponds to the membership of the College of Physicians of the present time, on August 7, 1604. For some reason his examination was interrupted. He presented himself for the first time on May 4, 1603, *ubi examinatus ad omnia satis apte respondit. Nibilo minus in alium tempus dilatus est cum conniventia ad Praxin*, that is, he was allowed to practice though the examination was left unfinished. He was examined a second time on April 2, 1604, and on August 7, was again examined and elected (*et eligitur*). He was formally admitted a sworn "Secundum formam Statutorum pro Candidatis" on Oct. 5, following. On November 24 of that year he was married at St. Sepulchre's, at the corner of Giltspur Street, to Elizabeth, daughter of Dr. Lancelot Browne, who was Physician to Queen Elizabeth and King James, and died in 1605.[14]

On June 5, 1607, Harvey was elected a Fellow of the college, and on February 25, 1609, he applied for the post of Physician in Reversion, corresponding to what is now Assistant Physician, to St. Bartholomew's Hospital, bringing letters of recommendation from the King, obtained, perhaps, through his brother John, and testimonials from Dr. Adkyns, President of the College of Physicians, and other Fellows. The Court of Governors "granted at the contemplation of His Majesty's letters that the said Mr. Harvey shall have the said office next after the decease or other departure of Mr. Doctor Wilkenson who now holdeth the same," provided he be not then in any other employment that may hinder him in performing the duties of the office.[15]

Dr. Wilkenson died that summer, and the house committee, on August 28, provisionally appointed Harvey to execute his office until the Court should meet. On October 14, the Court made the appointment. All officers of the Hospital to the present day receive a charge on appointment, and Harvey's Charge is preserved in the Journals and printed at length by Sir D'Arcy Power.[16]

A curious episode occurred a week later, when John Harvey prosecuted Marten Llewellyn the Steward of the Hospital for a debt of £52.10.0, long overdue to William Harvey. The steward was ordered by the Lord Mayor and Aldermen to pay the whole of his yearly stipend of £10 to Dr. Harvey till the debt should be fully paid.[17]

In 1613 Harvey was appointed Censor of the College of Physicians. It was an office of great responsibility then, as it is now. He was appointed Censor again in 1625, and in 1629.

On August 4, 1615, he was appointed Lumleian Lecturer to the College.

The Lumleian was a lectureship on surgery and anatomy founded by Lord Lumley at the instance of Dr. Caldwell in 1581. Lord Lumley was a Knight of the Bath and highly respected for his character. He died in 1609 without issue. Dr. Caldwell was a well-known and respected physician who had the unusual honor of being appointed Censor the very day that he was elected Fellow, December 22, 1559. He was President in 1570 and died in 1584. A regular course extending over six years was laid down for the lectures, which were to consist of readings from received authors on surgery with comments, partly in Latin and partly in English, together with dissections in the winter. Harvey, however, gave his first anatomical lectures, on the viscera, on April 16, 17 and 18, 1616. His notes, half Latin and half English, written in his execrable handwriting, were found, after they had long been lost, in the British Museum, in 1876. They were photographed, deciphered and printed by the College.

On May 7, 1618, the College published the "Pharmacopoeia Londinensis," in which Harvey, who had been a member of the committee which dealt with it, is described as Medicus Regius juratus. This is the first intimation of his appointment as Physician to the King.

In February, 1620, he was appointed with Mayerne and Clement on a Committee to watch the proceedings of the Surgeons. The following letter or warrant, mentioned by Lawrence[18] in his Life, was written to Harvey by James I in 1623:

James I to William Harvey
Royal Letters, Warrants.

Trustye and welbeloved, wee greet you well. Whereas we were graciously pleased heretofore to promise you the next place which should fall voyde by death, resignation or otherwise of Dr. Attkins, Dr. Mayerne, Dr. Chambers or Dr. Lister, our foure physitians in ordinarie which wee intend shall be certainly performed, we have though fitt neverthelesse out of our speciall favor unto you, in respect both of your ability in your profession and allso of your long being our servant extraordinary, to lett you knowe that in the meantyme your attendance upon our Person shall be as gratefull and with as much freedome to waite as our other physitions doe. Given under our signet at our pallace of Westmr. the third day of ffebruary in the twentieth year of our Raigne of Great Brittain, ffrance and Ireland.

In March, 1625, he and his brother John were admitted Members of Gray's Inn and in that month he attended King James in his last illness.

When, in 1626, the House of Commons accused Buckingham of High Treason before the House of Lords, the thirteenth Article of the Accusation stated that the Duke had been guilty of "transcendent presumption" in administering to the King a plaster and a posset, which the physicians did not advise, and the ingredients of which were unknown. Harvey had been examined by a Committee of the House before they drew up this charge. The popular belief was that Buckingham, being out of favor with the old King and in intimate friendship with Charles, had poisoned the father to place the son on the throne. Traces of this opinion may be found in the speeches of the accusers.* But

---

* It is repeated long afterwards by Milton in the "Defensio," Ch. v. "Nero" inquis

Harvey's evidence shows that the medicaments used had been found of benefit both by Warwick and Buckingham, that the King, who "took divers things whether they would [or] not, undervaluing physicians," desired to use them, and that Harvey, though not advising the plaster because he did not know its ingredients, it being "a secret of a man of Essex" [Remington of Dunmow who attended Warwick], "gave way to it, thinking it easy and could do no harm," which it evidently did not. The drugs in the posset apparently were known and the King drank it once or twice and commended it.[19]

All historians have agreed in believing Buckingham innocent, but there can be no doubt about his "transcendent presumption."

In 1626 Harvey was offered an official residence in the precincts of St. Bartholomew's where many notable people lived, but refused it,[20] and received instead an increase of salary from £25 to £33.6.8.

In 1627 he served on a committee appointed by the College at the request of the Privy Council, to report on some alum works in St. Botolph's, Aldgate, which the committee condemned as a nuisance.[21]

By Gwynne's death in November, 1627, a vacancy was made in the Electi. The position was offered to Mayerne, but as he excused himself on account of his constant employment at Court, Harvey was elected.

He was elected Treasurer of the College in 1628, and in that year he published at Frankfurt the book on which his fame commonly rests. "Exercitatio Anatomica de Motu Cordis et Sanguinis."

Harvey's whole life was dominated by two remarkable books, the "De Motu" which occupied him until he was fifty, and the "De Generatione" which was published when he was seventy-three. This seems a fitting occasion to review the work of the first part of his life, and in order to understand it we must consider the state of knowledge before his time.

The first physiological question which presented itself to the ancients was: Why does the body remain warm during life and become cold after death? We moderns answer it by saying that through all the minute and intricate changes which the assimilation of food involves, one great principle is maintained. The body takes in oxygen, and a vast variety of preparations of carbon, converts them into carbon dioxide, which is discharged through the lungs, and in the process of conversion produces heat as does every machine which burns coal or any other form of carbon. This action takes place only during life, but what life is we know no more than the ancients. We ourselves have only reached this explanation since the discovery of oxygen by Lavoisier, who perished in the French Revolution, but the ancients guessed that something of the kind took place, though their notions were dominated by the facts of the kitchen rather than by those of the laboratory. They drew their analogies most often from a boiling sauce-pan. It is not until the 16th century that Caesalpinus uses similes from chemistry. They always connected the "natural" heat (*calor innatus*, θερμασία ἔμφυτος) with the blood, and ascribed it to some kind

---

"matrem suam ferro necavit"; Carolus et patrem et regem veneno. That and many other passages are a lasting disgrace to Milton.

of "concoction" or "fermentation," for their similes recall now one and now the other, which took place in the veins and especially in the heart. The latter was considered the hottest place in the body.

The second problem was respiration. What function had the lungs? Aristotle thought that their only purpose was to reduce by the proximity of the cold air inspired, the excessive heat generated in the heart. Galen made an advance on this. He thought that the blood generated waste products (*fuligines*, τὸ λιγνυῶδες, like the smoke from a lamp) which escaped through the lungs and the skin, and that it also received from the inspired air something which in the heart changed it from purple to scarlet, and turned what he called the "natural" spirit (πνεῦμα φυσικόν) of the blood from the liver into "vital" spirit (πνεῦμα ζωτικόν). The remarkable thing, to my thinking, in Galen's theory is not its imperfection, but the close approximation which without any help from chemistry it makes to the real facts. If instead of "*fuligines*" we read carbonic dioxide, and put oxygen in place of the air, the theory very fairly represents what we believe today. To the theory of spirits we shall return later.

Thirdly they tried to explain the functions and relations of the heart, liver, veins and arteries. Aristotle believed that the heart was the origin not only of all blood vessels, but also of the nerves. Galen thought that the liver was the source of all veins, the heart of the aortic system and of the pulmonary vessels. Both of them held that the veins distributed blood; neither of them knew that they collected blood from the parts. Galen, however, ascribed a double function to the portal system of veins. He thought that it carried the products of the "first concoction" (roughly the same as "digestion") to the liver, and then after a "second concoction" in the liver, returned the blood, now provided with "natural" spirit and suitable for nourishment, to the same parts. He thus gave the portal veins a double function, first collective and then distributive, in which the blood ran in opposite directions. The inferior vena cava distributed the same blood from the liver downwards to the other parts of the body below the diaphragm, while the vena cava superior, which was thought to be continuous with it, carried it to the upper parts.

But a small part of the "natural" or "nutritive" blood went by the vena cava to the right ventricle. Of this some went straight into the left ventricle through small foramina in the "septum" or muscular wall between the two, while the remainder was ejected into the pulmonary artery and went to the lungs.

Of course this theory seems absurd to us now, and especially to a layman, but a man who knows his anatomy, if he will put himself in Galen's position and, forgetting all he knows about the circulation, will look at the position of the parts, the great vena cava running behind the liver and receiving the blood from it by the hepatic veins, and the part of it above the diaphragm continuous, as it was then thought to be, with the superior cava, and only interrupted by a hole through which some of the blood went to the heart, will not deny that under such conditions of knowledge the theory is plausible.

Galen knew the auriculo-ventricular valves of the heart, and the semilunar valves at the origin of the aorta and pulmonary artery, and not only knew their appearance but understood that they prevented the reflux of blood. He stated that when the chest contracts in expiration the pressure would force the blood in the pulmonary artery back into the heart if it were not for the valves, but as it could not go back it must go forward. If he had only followed out his own argument he would, as Harvey, who always speaks of him with the highest admiration, points out ("De Motu," Chapter VII), have discovered the pulmonary circulation, but this step he never took. He also had the curious notion that the left auriculo-ventricular valve had only two cusps (the right having three) in order that there might be a slight leakage for the waste products to escape from the left ventricle back into the lung. I am irresistibly reminded of my old teacher, Dr. Matthews Duncan, criticizing in his strong Aberdonian accent a certain Dr. Montgomery: "Now, gentlemen, this is what we are all too prone to do, reasoning from final causes. This is Dr. Montgomery of Dublin putting himself in the place of the Almighty—a most unsuitable position, gentlemen, a most unsuitable position."

Now as to Galen's conception of the heart's action. The heart is composed of various layers of muscular fibers, some of which run longitudinally, others circularly. Galen and Vesalius after him, thought that the former made the heart bulge into a globular form and increased its capacity, thus sucking blood out of the vena cava into the right, and air out of the pulmonary vein into the left ventricle, as a smith draws air into a bellows by separating its sides. By the contraction of the circular fibers on the other hand the cavities were diminished and the blood ejected into the pulmonary artery and the aorta. The mixture of air with the crude "natural" blood in the left ventricle produced a "vital" spirit, accompanied with great heat, and this was carried with the blood by the aorta and its branches to all parts of the body. Thus there were two systems of distribution, the veins carrying crude blood fit only for nourishment, the arteries vital blood necessary for growth, and heat. That the arteries and veins somehow communicated he knew, because by section of an artery you could drain the whole body of blood, but he was ignorant, as was Harvey, of how it took place. He thought that arteries and veins ended by open mouths and that the blood passed thus from one to the other.

That part of the vital blood which went upwards in the carotids, the lightest and thinnest and therefore the purest part, was subjected in the base of the brain to another process of elaboration which resulted in the formation of a "spiritus animalis" (*πνεῦμα ψυχικόν*) and the blood charged with this reached its highest perfection. It entered the hollow passages in the nerves and endowed them with sensory and motor power.

After death the veins are usually found full, and the arteries comparatively empty. This had led Erasistratus to suppose that the arteries carried spirit and the veins blood. Galen showed by opening an artery between two ligatures that they certainly contained blood. He thought further from his experiments that the arterial pulse was not due to the wave of blood entering the arteries, but to a power of active dilatation communicated to the arterial wall from the heart (δύναμιν απὸ καρδίας ἐπιπέμπεσθαι τοῖς χιτῶσι τῶν ἀρτηρίων τῆν διαστέλλουσαν αὐτὰς, οὐχ ὕλην διὰ τῆς κοιλοτῆτος). Both this view and the bellows theory were attacked by Harvey.

These are Galen's views so far as they can be made out by comparing various passages in his writings. But he is not always consistent in his statements, and his works are very voluminous.

The spirit doctrine of Galen was carried to its furthest pitch by Fernelius (1497–1558) whom Harvey cites as its chief defender. Fernelius really used the word "spirit" almost as we now use the word "function." Every organ in the body had its spirit, there was a spirit of the liver and of every other viscus, and even of the bones and soft parts. He also adopted the three spirits, natural, vital and psychic, which Galen had ascribed to the blood. These doctrines were vigorously attacked by Harvey in the Proeme of the "De Motu," and again in the second letter to Riolan in which he exposes the absurdities to which they led.

But it must not be supposed that Harvey was the first to attack the old physiology or even the first to form a conception of the circulation.

Servetus, who was burned as a heretic by Calvin in 1553, had in a theological treatise "De Trinitatis Erroribus," published in 1531 and reprinted in his "Restitutio Christianismi" 1553, clearly described the pulmonary circulation.

> The vital spirit has its origin in the left ventricle of the heart, though the lungs assist most to perfect it. It is a thin spirit, worked up [*elaboratus*] by the force of heat, of a scarlet [*flavo*] colour, and a fiery potency, so that it is brilliant as if from a purer blood, and a vapour containing the substance of water, air and fire. It is generated by the mixture in the lung of the inspired air with the subtle elaborated blood which the right ventricle communicates to the left. But this communication takes place not through the septum [*medium parietem*] of the heart as is commonly believed, but by an ingenious plan [*magno artificiò*] the subtle blood is led and driven [*ductu agitatur*] from the right ventricle of the heart through the lungs, it is prepared and made scarlet by the lungs, and is poured from the pulmonary artery [*vena arteriosa*] into the pulmonary vein [*arteria venosa*]. Next in the pulmonary vein it is mixed with inspired air, and by expiration is purged of its fumes, and so at last, the mixture completed, is drawn in by the left ventricle by means of its diastole, a fit material for the making of vital spirit [*apta supellex ut fiat spiritus vitalis*]. That communication and preparation takes place thus through the lungs, we are taught by the various conjunctions and communications of the vena arteriosa with the arteria venosa in the lungs. This is confirmed by the remarkable size of the vena arteriosa, which should be neither of that fashion nor of that size, nor should send such a quantity of pure blood into the lungs for their nourishment alone; nor should the heart serve the lungs in that fashion, especially when in the embryo the lungs are accustomed to get their nourishment from another source, on account of those membranes or valves of the heart [the foramen ovalel up to the time of birth, as Galenus says. Therefore it is for another purpose that the blood is poured from the heart into the lung at the very time of birth, and so copiously. Also from the lungs there is sent to the heart not simple air, but blood and air mixed, by the arteria venosa; therefore it is in the lungs that the mixture takes place. The scarlet colour is given by the lungs to the spirituous blood, not by the heart. In the left ventricle there is not room for so

great and copious a mixture, nor is the working up [*elaboratio*] of the blood sufficient to produce the scarlet. Lastly, the middle wall, since it has neither vessels nor means of passage, is not adapted to the communication and elaboration supposed, though something may soak through [*licet aliquid resudare possit*]. By the same means by which in the liver there is transfusion from the vena porta to the vena cava for the sake of the blood, there is also in the lung transfusion from the vena arteriosa to the arteria venosa for the sake of the spirit. If any one will compare the above with Galen's description in Books 6 and 7, De Usu Partium, he will thoroughly understand the truth, though it was not observed by Galen himself. And so that spirit from the left ventricle is poured thence into the arteries of the whole body, so that its thinner part rises to the upper parts of the body, where it is still more elaborated, especially in the retiform plexus, beneath the base of the brain, where from "vital" it begins to be the "animal" spirit ministering to the proper function of the rational "anima."*

Harvey does not mention Servetus, whose "Restitutio" was not published, but printed (in 1553) and circulated privately, and probably had never read him, for on the latter's condemnation all his books that could be obtained were destroyed, and it is said that only three copies have been subsequently discovered. Columbus[22] is thought by some to have taken Servetus' view without acknowledgment. Harvey quotes him in the Proeme to the "De Motu." Columbus writes:

> Most think that the blood goes from right to left through the septum, but they are wrong; for the blood is carried to the lung by the vena arteriosa, is there thinned, then together with air is carried by the arteria venosa to the left ventricle, which no one has hitherto either observed or left in writing.

The pulmonary artery, he says, is much bigger than would be necessary for nourishing the lung alone. Its function is also to change the blood itself (*quem pro corde alteret*). This argument, it will be noticed was used by Servetus also, but Columbus does not repeat Servetus' second argument about the course of blood in the embryo. Though, however, Columbus described the pulmonary circulation, he thought that the portal system of veins had the two functions usually ascribed to it of carrying chyle to the liver, and nutriment to the intestinal tract, and he also described the vena cava and its branches as distributing blood to the parts from which we know that they derive it. It may be added that Columbus thought that the reason why the left ventricle was so much thicker than the right was that the blood which was there thinner should not leak through it (*ne exsudaret*).

Andreas Caesalpinus (1524–1603), Professor at Pisa, published his "Quaestiones Peripateticae" in 1571 and in the second edition published in 1593 added "Quaestiones Medicae." There can be no doubt that he understood and described the pulmonary circulation, and in the latter treatise he describes the swelling of the vein below a ligature and explains it rightly. He does not, however, give a full account of the systemic circulation and he has many mistaken notions about it. Neither Harvey, nor any of Harvey's defenders or opponents, so far as I can find, mentions his name, and it is difficult to explain why. He devoted himself to defending Aristotle's views and attacking those of Galen, and it is possible that this may be the reason. The authority of Galen stood so high that to controvert him was looked upon as nothing less than heresy. Caesalpinus had not been accepted by Fabricius at Padua, and it is therefore probable that Harvey did not know of his work. Boyle tells us that Harvey was led to his discovery by pondering on the valves of the veins. But Harvey also lays great stress on the effect of blocking a vein, and it seems unlikely either that he who quotes so many writers would have refrained from quoting the observation of Caesalpinus, or that he would have dared to do so, even if he had wished. The chief argument of Primrose, who was a pupil of Riolan, was that what was new in Harvey's theory was not true, and that what was true was not new. If he or Riolan either had known of Caesalpinus, they would certainly have attacked Harvey for stealing his theory.

---

* The "Restitutio Christianismi" was reprinted in 1790 though the reprint is dated 1553. "De Trinitate" is the first essay in the book, and this passage begins on p. 170.

It has been said that Harvey owed his fame to the opposition which he aroused, and that if he had not been attacked by Riolan he would not have been hailed as the discoverer of the Circulation. It seems truer to say that while prejudice against any innovation was so strong that the mere statements of Servetus and Caesalpinus could be ignored, it was impossible to treat in that way such a body of experimental evidence as Harvey brought forward. It had to be accepted or disproved. It may be added that fifty years had elasped since Caesalpinus first wrote, and thought had become slightly less conservative in the interval. At all events, Harvey's contemporaries, Riolan, his chief opponent, and Bartholin, Walaeus and De Beck who favored Harvey's views, all treat him as the inventor of the theory, nor do any of them mention Caesalpinus.

The "De Motu Cordis et Sanguinis" begins with a dedication to the King, and another to Dr. Argent, President of the College, in which Harvey says that all the vivisections and experiments on which it is founded have been performed before the eyes of the Fellows. Then follows a Proemium which is worth analyzing because it mentions and criticizes one by one all the various theories extant at the time, but it must be owned that Harvey's criticism is sometimes as confusing as the theories he criticizes.

Most anatomists, physicians and philosophers, he says, agree with Galen that the movement of the heart and arteries on the one hand, and of the chest and lungs on the other, are for the same purpose, and that the lungs are provided to cool the blood, because the pulse alone is insufficient. That the arterial pulse, when cool arteries dilate, serves to draw in the air (from the open ends in the skin), and the following contraction is to expel vapors, just as in the lungs.

But if that is the case, why does not the pulse diminish in size and frequency when the body is immersed in oil so that no air can get to it?

How in the simultaneous dilatation of all arteries throughout the body can air reach the deeper arteries as quickly as the superficial?

How can air reach the arteries in the fetus, which have a pulse while yet in the womb?

How can it reach the arteries in seals and whales which live under water?

And if contraction is to expel waste products (*fuligines*) why does it not also expel spirits, which these people believe the arteries to contain?

And lastly why, if an artery is wounded, is there no sign of the ingress or egress of air or vapors?

Now as to the use of the arterial pulse. If it is to cool the blood why is it commonly said that the vital blood in the arteries warms the body?

And why, if you tie an artery, do the distal parts get cold? And if the pulse attracts blood from the heart to warm the parts why should it also attract air from the outside to cool the blood or how can it do both at once?

They say the arterial blood contains spirit, but do not deny that the venous blood contains spirits also. Yet the blood is the same in both. Spirit is at any rate not separate from blood. If it exists it is incorporated in it.

The diastole of the heart cannot be simultaneous with the pulse which is the diastole of the arteries. If it were, both would dilate and draw on the blood at once, and there would be no passage from one to the other.

The pulse cannot be due to active movement of the arterial wall since it occurs in an aneurysm where the wall is destroyed.

The heart is said to be the workshop of the "spiritus vitalis." Yet this function is confined to the left ventricle, and the right is credited only with the supply of nourishment to the lungs.

But is it likely, as Columbus asked, that so much blood should be carried to the lungs alone, especially as they have a separate supply, or that for the lungs alone such a great vessel as the pulmonary artery should be needed?

As for the idea that waste products escape back from the left ventricle into the lung, how can they be separated from the air which is supposed to be drawn into the ventricle or from the spirit which is manufactured in it?

Still less likely is the notion that blood is drawn from the right ventricle into the left through the "porositates" of the septum. "Sed, me hercule, porositates nullae sunt." The septum is the densest part of the whole heart. And why should the blood take these invisible ways when there is an easy passage for it through the lungs?

This long rigmarole is useful since it shows the extreme confusion of the physiology of the time. A great contrast is presented by the orderly and logical sequence of the treatise itself.

In it (Chap. I) he claims that he has solved the problem of the heart and arteries, and desires to submit his theories to criticism. (Chap. II.) He describes the movements of the heart. They are easier to observe in cold-blooded animals. The impulse on the chest wall is synchronous not with diastole, or the period of dilation when the heart is largest, as is usually thought, but with systole, or the period of contraction, when the whole heart contracts like a muscle, alters its shape, strikes the chest wall with its apex, as can be seen in a vivisection, and expels the blood from the ventricles. It is not a partial contraction as some, including Vesalius, have thought, but the whole mass of fibers contracts together. The dilatation which follows is not an active process but is due to the influx of blood from the veins.

(Chap. III.) When the heart contracts the arteries dilate, and the time and force of the arterial pulse vary with that of the heart. If an artery be wounded the blood spurts out of it at the time of the cardiac systole. It is clear that the arteries are distended by the blood expelled from the heart, and that their dilatation is a passive movement like the filling of a wine skin, not like that of a bellows which sucks in air by active expansion. The pulmonary artery (*vena arteriosa*) is filled by the blood from the right, the aortic system by that from the left ventricle. (Chap. IV.) The auricles contract together, and slightly before the ventricles, as can be seen in the heart of a cold-blooded animal, in which the motion is much slower, or in the dying heart of a warm-blooded one. In dying the left ventricle is the first part to cease to beat, and the right auricle the last. The auricular contraction is felt in the ventricles after they themselves have stopped beating, and if you then cut off the apex of the ventricle, blood will spurt out at every contraction of the auricles. The red spot that can be seen to pulsate very early in the developing chick is the auricles, which is thus the first part of the heart to live as it is the last to die. In almost all creatures, even snails, shrimps and insects, pulsation can be seen. (Chap. V.) The sequence of events then is that the auricle contracts and expels its blood into the ventricle, thus dilating it, and the ventricle thereupon contracts and expels its blood into the artery leading from it. But in warm-blooded animals the two contractions are so rapid that they seem as one. (Chap. VI.) The passage of blood through the lungs has been misunderstood. In cold-blooded animals which have no lungs there is no difficulty. The blood is expelled from the single auricle into the single ventricle, and thence into the artery. In the human fetus part of the blood from the right auricle passes through the patent foramen ovale into the left auricle and so into the left ventricle, while that part which enters the right ventricle is thrown into the pulmonary artery and so through the ductus arteriosus, also patent then, into the aorta without passing through the lungs. Thus "the condition of Embryons that have lungs and make no use of them is like to the condition of those creatures which have none at all." These apertures, the foramen and the ductus, close up in the normal man at or soon after birth, and then all the blood from the right auricle passes through the lungs. (Chap. VII.) It has been alleged that the blood could not pass through the tissue of the lungs. But the liver and kidneys are much denser, yet everyone allows that the blood passes through them, and whereas there is no special impulse to drive it through them, the right ventricle is specially adapted to force it through the lungs. The passage is favored, as Galen stated, by the pulmonary semilunar valves which, preventing regurgitation force the blood onwards, when the chest contracts, into the radicles of the pulmonary vein, by which it reaches the left auricle and ventricle. The whole system of the cardiac valves, semilunar and cusped, is designed to prevent regurgitation and to force the flow forwards. (Chap. VIII.) But now he has to state a theory that will bring him much opposition and many enemies. After much pondering he formed the notion that there was a circular motion of the blood from the heart through the arteries into the various parts where it gives heat and nourishment, and thence back to the heart through the veins, the whole movement due to the force of the heart. (Chap. IX.) The evidence of this is: (1) that he has found the left ventricle to contain sometimes more than 2 ounces of blood. All allow that some of it is ejected into the aorta at each beat. Let it be a minimal quantity, say even as little as a drachm. Then since the heart beats at least 1000 times in half an hour 1000 drachms (62½ ounces av.) will pass in that time. This is about as much as the whole mass of blood in the body, and far greater than could be supplied by any intake of nutriment.* (Chap. X.) (2) That ligature of the main vein causes the vein to become empty on the cardiac side, but to become distended on the distal side of the ligature. as may be seen in serpents and fishes "so that you must needs affirm the reflux of blood unless you will deny your own eyesight" (Chap. XI). And the same thing can be seen in man if you constrict the arm by a ligature not tight enough to block the arteries, but enough to block the veins (Chap. XII), and also by the effects of varying pressure either by physical means, or by such emotions as weaken the heart and lead to faintness. (Chap. XIII.) (3) That the valves in the veins are so placed as to prevent reflux towards the distal parts and must therefore aid the flow towards the heart. (Chap. XIV.) That is the main evidence. The blood therefore passes through the lungs and heart propelled by the force of the ventricles, and is distributed to all the parts, and there it creeps into the porosities of the tissues and so into the veins and returns from the small veins into greater and thence into the vena cava and at last arrives at the auricle, in quantity such as cannot be supplied from outside sources. It must then be concluded that it has a circular and a perpetual motion and that of this the motion and beat of the heart is the sole cause. (Chap. XV.) The theory is probable also for other reasons: (1) The blood after giving up heat and nutriment requires to return to the center where it may obtain a fresh supply. It is aided in its course through the veins by the pressure of the muscles. (Chap. XVI.) (2) The rapid diffusion of poisons and drugs, and of the products of digestion, requires some such mechanism to explain it. (Chap. XVII.) (3) The size of the heart points to a correspondence with the work it has to do. The larger the animal, and in man the bigger and stronger the individual, the larger is the heart. And this includes the auricles. They are not mere receptacles, as is usually thought, but they expel blood into the ventricles by active contraction. The ventricles do not attract the blood by an active expansion. All animal motion is contractile. There is no tissue that actively expands. Consequently wherever there is a ventricle there must be an auricle and "motores primi sunt sanguinis auriculae."

So Hippocrates was right in calling the heart a muscle for its action is of that kind, and Aristotle was right in thinking the heart the chief organ of the body.

---

* It is now calculated that the heart ejects over 3 oz. at each beat, and the amount of blood is taken at one-fifteenth of the body weight or 10½ lbs. av. for a man of 11 stone. Harvey's argument holds by either calculation.

Similarly the thickness of the arteries is to withstand the impulse of the blood; as they get smaller and further from the heart their coats become thinner, and the pulmonary artery is not so thick as the aorta because the right ventricle is not so strong as the left.

Harvey's doctrine that the current of blood in all veins without any exception was towards the heart, and that no vein took any part in distributing blood to the body, which office was confined to arteries, was in the eyes of his contemporaries revolutionary. We know from his own words that it created a great sensation and met with violent opposition. But only three persons wrote definitely against him, and of these, two, Primrose and Parisanus were acknowledged even by Harvey's opponents to have made themselves ridiculous. Ent, a much younger man than Harvey, answered Parisanus, but Harvey made no reply to either and in his later book ("De Generatione" Chapter LII) he says, "I perceive that the wonderful Circulation of the Blood first found out by me is consented to almost by all; and that no man hath hitherto made any objection to it greatly worth a confutation." Descartes, as early as 1637 ("Discours sur la Methode") had assented to his views and the German and Netherlands professors one after another endorsed them.

But in 1648, John Riolan junior, Professor of Anatomy at Paris, and the leading authority in Europe, in his "Encheiridion" put forward the opinion that while the circulation theory was true for the system of the aorta and vena cava, it was untrue for the pulmonary system, and it did not hold for the portal area, or for the smaller divisions of the aortic system itself. On this Harvey again entered the field and published two essays in answer.

In his first essay ("Exercitatio prima de Circulatione Sanguinis") Harvey begins by showing how illogical Riolan's position is. The efficient cause of circulation is the pressure exerted on the blood column in the arteries by the contraction of the ventricle. This acts just as much on the blood in the arteries of the abdomen as elsewhere. Riolan allows that the arterial pulse is due to the influx of blood. But it can be felt or seen everywhere down to the tips of the fingers. The abdomen cannot be exempt. He accuses Riolan of "hedging" in order to conciliate conservative prejudice (*videtur officiose loqui*). Incidentally he points out a third circulatory system, that of the coronary arteries and veins, whose only function is to convey blood to and from the heart itself. Riolan claims to believe in the Anastomosis of Galen—the communication by open mouths of arteries and veins—where is it? Harvey has hunted for it and has never been able to find anything of the kind except in three places, the choroid plexus, the pampiniform plexus, and the plexus with the umbilical vein.

In his second essay (Exercitatio Altera, etc.) he talks of Galen's cannula experiment. When he wrote the "De Motu" he had not tried it, and thought it would not lead to any result. Now he has tried it and has found it to be complicated with too many difficulties to be of use. But so far as the theory it was meant to prove, namely that the arteries dilated actively by a power communicated to their walls from the heart (see p. 254), he cites the case of a man, part of whose abdominal aorta was converted into a stony and perfectly rigid tube, through which no vital impulse could have passed, yet the pulse could be felt normally in the feet.

He is convinced that the arteries are passively dilated by the influx of blood, but he allows that their recoil is due to their own elastic walls.

Some allege against the theory of the circulation that venous blood differs from arterial. But if you put a sample of each in a saucer (*acetabulum*) and keep it for a time, there is no difference to be seen. Men think they are different (1) because they differ in color, but this is because the blood is squeezed through a small aperture, and later he says pulmonary blood is red because the passages in the lung are small. (Harvey is here of course totally wrong.) (2) Because after death the veins are full and the arteries empty, but this is because the force of the right ventricle fails and is insufficient to drive the blood through the lungs. (We now think that also the arteries by contraction empty themselves.) (3) Because they think arterial blood contains more spirit and therefore takes more room, but spirits are the excuse for all ignorance; we make of them *ϑεον ἀπο μηχανῆς*, *deum ex machina.*

He then gives a disquisition on the various forms that spirits have taken in connection with theories on the blood, mentioning Fernelius as the leader of these opinions. He concludes that spirit cannot be separated from the blood, the two are one, and blood without spirit is neither living nor life-giving. But spirit does not inflate it or ferment it. Nor are there various forms of it such as natural, vital, and animal. It is simply what gives blood life.

Some think that spirit is the source of the blood's heat. But the blood is naturally hot, and expiration is probably to ventilate and purify the blood (by expelling fuligines), while inspiration is to cool it (Galen's view, cf. p. 253).

Some reject the theory on the ground that circulation is of no use, but (1) it ought to be our creed to inquire whether a thing is, before inquiring why it is: (2) there are many things that we believe without knowing the reason for them.

He grants that the rate of circulation may vary. The thinner, purer, more spirituous blood will move more quickly than the thicker and more earthy. And the nutritive part, call it ros or cambium or what you will, sticks to the tissue it is to nourish. When the lungs (or other tissues) are congested or inflamed, the blood cannot pass so quickly as in health. Many other conditions may alter the rate.

And lastly he sums up. He does not hold with extravagant statements about the suzerainty (*principatus*) of the heart whether by Aristotle or any one else. He thinks that such statements as that the heart is the fount, origin and cause of life, can only be accepted if the veins, arteries and blood are included with it. If only the ventricles and auricles are meant he does not think it is the manufacturer (*opifex*) of the blood, nor that the blood derives from it its "vis, virtus, ratio, motus, aut calor"; he thinks that the cause of diastole of the heart is different from that of systole, that the first cause of "distension" is the innate heat, and the first beginning of distension is in the blood itself in the vena cava just outside the right auricle ("where it behaves as if it were fermenting, becoming sensibly thinner and rising up") and that distension also comes to an end in the blood itself, i.e., is not produced by any action of the heart, and he agrees with Aristotle's comparison to boiling milk or gruel. The rising and subsidence of the blood do not depend upon exhalations or spirits or any external agent, but on its own internal principles working according to natural laws. It does not derive its heat from the heart, it is itself the hottest thing in the body.

And though he will not state it as a fact, yet he suggests for discussion that the innate heat may be the common instrument (or efficient cause) of all processes and even the immediate cause of the beat of the heart.

This then is the course of the blood, namely from the right auricle into the ventricle, from the right ventricle through the lungs into the left auricle, and thence into the left ventricle and the aorta, and from the heart through all the arteries, and through the porosities of the tissues into the veins, and through the veins back to the heart again, and all at great speed.

If now we reflect on these three essays and recall the three problems mentioned above (p. 252) we see that Harvey's work is almost entirely concerned with the third of them, the mechanism and forces of the heart arteries and blood. It is in this region that he has been the pioneer and the discoverer, and in this region alone. If we ask what did Harvey think of the temperature of the body, we find him giving different answers* in 1628 and 1648. In the "De Motu" he speaks of the heart as the source of heat. The blood having parted with its nutriment and warmth to the tissues and become thickened and effete, comes back to the heart "ibi calore naturali potenti fervido tanquam vitae thesauro colliquatur [is liquefied] spiritibus et ut ita dicam balsamo praegnans." (Chap. VIII.) And again in Chap XV he declares his adhesion to Aristotle's view that the heart was the sole source of heat and spirit. His later view has just been given. In it the site of the heating, which he still thinks of as a culinary operation, is transferred to the termination of the return branch of the circuit, where to the effete blood in the vena cava the products of digestion have just been added by means of the hepatic veins.

We must therefore say that Harvey had not made any advance on the question of animal heat.

And the same must be said on the function of the lungs. He, like the ancients believed (see p. 262) in his later years, that the object of respiration was to expel waste products and to cool the blood, even though he had previously (p. 258) ridiculed the idea that the blood which was the source of the body's warmth needed cooling.

Further we must ask what did Harvey really think about spirits? It is true that he ridicules the absurd lengths to which the theories were pushed, so that as he says, wherever men are faced with a problem they do not understand, they explain it by the action of spirits. But he was far from disbelieving in the spirituous content of the blood. He over and over again speaks of it, and talks of part of the blood being more spirituous, and also thinner and purer, than other parts. What Harvey meant by spirituous blood was living blood, what he meant by spirit was that which gave life, and we can only conclude that, not knowing what life was, he, like the very men he ridiculed, was obliged to resort to "spirit" to explain it.

---

* Dr. Crawfurd's Harveian Oration (1929) brings this out admirably.

Lastly, though he could trace the blood down to the smallest visible arteries, and back from the smallest visible veins to the heart, he could not show the capillary system which connects the two. He knew there must be a connection partly from Galen's experiment of draining all the blood out through one artery, partly by the force of his other reasoning. He guessed it to occur through porosities in the soft parts, and he gave a further proof of their existence in the disappearance of congestion in the head of those dead by hanging, after the cord had been loosened. Four years after his death Malpighi saw through a microscope the capillary system of the frog's lung and the problem was solved.

Apart from his theory of the circulation Harvey made three great contributions to physiological method. First he introduced the comparative study of other animals. He vivisected mammals, birds, fishes, reptiles, frogs and even snails and insects. He himself says ("De Motu," Chap VI) that. if men "were as well practised in the dissection of creatures as they are in the Anatomy of men's carcasses, this business, which keeps them all in doubt and perplexity, would in my opinion seem clear without any difficulty," and the ridicule which was cast by his opponents on arguments from the lower animals proves that this method was new. It was in the cold-blooded animals, fishes and snakes for instance, that he was able to see, while life was still maintained, the sequence of the auricular and ventricular contraction for the first time clearly. In warm-blooded animals the movements are too quick to be distinguished.

Secondly he carried out a series of ingenious physical experiments, which showed that in arteries the blood accumulated on the proximal or cardiac side of a ligature, in veins on the distal, and thereby proved that the blood ran from the heart in the former, but toward the heart in the latter. He thus introduced the experimental method into physiology.

And thirdly, by quantitative estimation, rough it is true, but sufficient for the purpose, of the amount of blood expelled into the arteries by each contraction of the heart, he showed the impossibility of supplying from sources outside the circulatory system the large amount required. It must, therefore, be the same mass of blood that was driven round and round, to the periphery in the arteries, and from the periphery in the veins, and the main driving force must be that of the heart. This is the first introduction of quantitative calculation into the science of physiology.

IV. HARVEY, 1629–1657

We left Harvey one of the Electi, and treasurer of the College. In 1629 he was re-elected treasurer and elected Censor also. On December 3, 1629, having given a dinner (the College dinners are always described as sumptuous in the Annals) to the Electi, he announced that he had been ordered to go abroad with the Duke of Lennox, and asked leave to resign the treasurership. He resigned his censorship also, and on December 22 Clement was elected in his place.

The Duke, however, did not start till the end of July, 1630, and Harvey attended the College Comitia until June 28th. The meetings were then interrupted by the Plague. Harvey was absent at the next Comitia, on September 30, but he was present at a small meeting on October 8, when he signed the letter of license given to Marco Antonio Filippi, an Italian, and is then described in the Annals as Physician in Ordinary to the King. His appointment, therefore, dates probably from the beginning of October, 1630, and he was present at the Comitia on December 22, 1630, and March 24, 1631.

He was absent on April 4, 1631, but it is stated in the minutes that he had now succeeded Dr. Poe, deceased, as Medicus Regius pro Hospitio Regis, Physician to the Household. He certainly cannot have been with the Duke after that, and it is not likely that he came over from France in October and December merely to attend the Comitia. The probability is that he was not in attendance on the Duke after October 8.

In the Calendar of State Papers (*Domestic 1637, Charles I*) there is a warrant for the payment of £300 to Dr. William Harvey, one of his Majesty's Physicians in Ordinary, as a year's salary up to Lady Day 1631. This looks as if he had been appointed early in 1630, but the warrant is six years late, and may well be in error. The College Minutes are more trustworthy.

In 1633 the King went to Scotland for his coronation, and Harvey applied for leave from St. Bartholomew's on May 13 to go with him. He attended Weston, the Lord Treasurer in an attack of renal colic at York on the way. At a banquet, given by Edinburgh to the King on June 23, Harvey was admitted a freeman of the City and a guild-brother,* and it was either at this time, or later, that he visited the Bass Rock, which he describes in the "De Generatione." He was back in London by October 5, as on that day he proposed to the Governors of St. Bartholomew's, and they agreed to discuss later, some regulations which he had drafted for the Hospital.

In September this year, Harvey, Atkins, and Paddy resigned their position as Electi, probably from lack of time owing to their Court appointments; but their resignations were not accepted.

The year 1634 was the year of the Lancashire witches. Pages upon pages of the Journals of the House of Lords are occupied with reports on the subject. Seven women were condemned, three of whom died in prison, and the remainder were sent to London, where they were examined by a committee of midwives and surgeons under the direction of Harvey, who found on their bodies none of the signs then supposed to indicate a witch. They were accordingly pardoned.

In 1636 the King, in one of his fruitless attempts to obtain the restoration of his nephew, Charles Louis, to the Palatinate, sent the Earl of Arundel on a special mission to Ferdinand II, Emperor of Germany. The Earl was the greatest figure in England at the time. He was the grandson of that Duke of Norfolk who, for aspiring to the hand of Mary Queen of Scots, had been condemned as a traitor and beheaded by Queen Elizabeth. His father and mother had been cruelly imprisoned and his father had died in the Tower. He had been brought up by his mother in great poverty but had won the favor of James, was restored to the title of Arundel and Surrey, and married Alethea Talbot, who inherited the great riches of the Shrewsbury family. In 1621 he was made Earl Marshal. But in 1625 he fell into disgrace through the secret marriage of his eldest surviving son, Frederic Henry Lord Maltravers, with Lady Elizabeth Stuart, sister of Lennox, and cousin of Charles. Charles sent him to the Tower, but this raised such a storm in the House of Lords, which was in session at the time, that he was forced, after a short time, to release him, though under severe restrictions. In fact for fully two years the Earl was under what we should call open arrest. Arundel was one of the greatest collectors of his time. Pictures, statuary, cabinets and works of art of all kinds were bought by him through the Rev. William Petty who travelled for him in Italy, Greece and the Levant. The Arundel marbles were given to Oxford by his descendants. He had known Harvey since 1616 and he now made him a member of his suite. Harvey accompanied him to the Emperor's Court, but after taking part in one or two hunting parties, and a great dinner, and after admiring the Queen of Hungary's babies, left him, and proceeded to Italy. His adventures there will be described later. He rejoined the Earl at Ratisbon in November, returned with him to England at the end of the year, and was present at a meeting of the College on February 13, 1637.

---

* The town clerk of Edinburgh has been kind enough to confirm this by a letter to me. He thinks that the honor was given by reason of Harvey's position at Court, and not with reference to his discoveries, as no reference to them is to be found in the Record.

From this time we know nothing of Harvey's life for a few years, except from the College Annals. He attended meetings of the College intermittently, and was absent during the summers of 1639 and 1640, when he was probably with the King in his military expeditions against the Scotch. In 1641 Charles again went to Edinburgh, this time in the hope, vain as it turned out, of obtaining Scotch support against Parliament. On this occasion Harvey certainly accompanied him, for on August 30 he was at Aberdeen and, together with Adrian Metcalfe the King's apothecary, and Alexander Middleton, sub-Principal of King's College, was given the freedom of the City. By the kindness of Dr. Clark Souter I was enabled to see the entry in the Burgess Roll.*

In 1642 the Civil War broke out, and Harvey followed the King "not only," as he told Ent "with the permission but at the command of Parliament." He was present at the battle of Edgehill, and Aubrey tells the well-known story that Harvey was sitting under a hedge with the two young princes reading a book, when a cannon-ball came so near them that they had to shift their quarters. Harvey told him of the condition in which Adrian Scrope was found next day, so that he must have seen something of the wounded.

In 1643 Harvey, for the last time, drew his salary as Physician to the Hospital, and in that year Parliament, which claimed a great deal of authority that did not belong to it, ordered the Hospital to dismiss him, and appoint Dr. Micklethwayte. Par-

---

*See Dr. William Harvey and Aberdeen by W. C. Souter (*Aberdeen University Review Nov. 1931*) who gives a conjectural explanation of Harvey's visit.

liament sent a similar order to St. Thomas' Hospital to dismiss Mullins, their surgeon and appoint Cleere. St. Thomas' replied that they were accustomed to appoint their own officers. St. Bartholomew's answer is not recorded, but they did not appoint Micklethwayte till 1648. The following letter[23] addressed to Prince Rupert refers to Harvey's attendance on Prince Maurice during the Campaign. It is undated.

May it please your Highness.
This last night arrived here at Milton Dr. Harvey and Dr. Smyth and this morning they with the two other doctors having seen and spoken with His Highness your brother intreated me to write as followeth.
That his sickness is the ordinary raging fever of the army, a slowe fever with great dejection of strength and since Friday he hath talked idly and slept not but very unquietly yet the last night he began to sleep of himself and took his rest so quietly that this morning when Dr. Harvey came to him he knew him and welcomed Dr. Smyth respectively and upon Dr. Harvey's expression of His Majesty's sorrow and great care of him he shewed an humble thankful sense thereof. Dr. Harvey asking His Highness how he did he answered that he was very weak and he seemed to be very glad to hear from Your Highness as was delivered by Dr. Harvey. Now the doctors having conferred and computed the time have good hopes of his recovery yet by reason that the disease is very dangerous and fraudulent they dare not yet give credit to this alteration. And concluding the disease to be venomous they do resolve to give very little physic, only a regular diet and cordial antidotes. The doctors present their most humble service to your Highness and subscribe themselves

Will Harvey
Robert Vilvain
Edmund Smith
Thos King.

There is an additional note by Rich. Cave that the Army is about to march to Plymouth. The letter was therefore probably written early in 1645 when Grenvile besieged Plymouth.

Harvey was with the King at Oxford, and when, in January, 1645, Lennox and Southampton went to Uxbridge to treat with the Parliamentary Commissioners, Harvey went in the suite of the former, and his friend, Edmund Smith, in that of the latter (*Journal House of Lords*). The University conferred on him the degree of M.D.

Then followed the picturesque episode of his appointment as Warden of Merton. Nathaniel Brent, a lawyer, and vicar-general of the Province of Canterbury, in which position he had carried out Laud's policy, had been elected Warden in 1622. But on the outbreak of the Civil War he had joined the Parliamentary party and had left Oxford. In January, 1645, the King pronounced his deposition as a three years' absentee and a rebel, and directed the seven senior Fellows to present three names for the King's choice. Following, no doubt, indications of the royal wishes, five of the seven placed Harvey first on their lists, and he was appointed by the King on January 27. His speech on his reception by the College is not in his happiest vein. He said that perhaps his predecessors had coveted the office that they might enrich themselves (and this charge was definitely brought against Brent), but his own hopes were that he might rather enrich and profit the College than himself. He ended by urging good fellowship upon the Fellows.

There was an abortive siege of Oxford by Fairfax in 1645. Naseby was fought on June 14, and on April

27, 1646, the King fled in disguise. On May 11, Fairfax summoned the town, which on June 24 surrendered on honorable terms.

There is I am told no record at Merton of Harvey's year of office. We know however that he was accustomed to go to the rooms of George Bathurst, a Fellow of Trinity (not Ralph Bathurst afterwards President, and F.R.S.), where the two made many observations on the incubation of eggs and the development of the chick. These no doubt formed the substance of a good deal of the "De Generatione."

The Queen had been living in Merton during the early years of Harvey's residence in Oxford, but had left in 1644, before Harvey became warden, to go to Exeter, where Mayerne and Lister attended her, and where she was confined of Princess Elizabeth.

With the capture of Oxford Harvey's wardenship ended. Brent resumed office, but was shortly replaced by Goddard, a well known Fellow of the College of Physicians, and one of the Physicians attached to Cromwell.

Meanwhile the King had taken refuge with the Scotch Army, and had by them been taken as a virtual prisoner to Newcastle. In November, 1646, a pass was issued to "Dr. Harvey, the King's Physician," to go to Newcastle to attend him (*Journal, House of Lords*), and this was the last time that Harvey was in attendance on, or saw the King. We know all the details of Charles' life after this, from Herbert's "Memoirs." Neither Harvey nor any other physician is mentioned as belonging to his scanty household. When Pembroke fell ill at Holmby House, John Bathurst, Cromwell's doctor, came down to look after him. On September 7, 1648, a letter was read to the House of Lords (*Journal House of Lords*) in which Sir Edward Walker asked that either Harvey or Wetherborn,* Physicians to the King, and Humfrey Painter his Surgeon might be sent to him at Newport. But the request does not seem to have been granted. Herbert says that Charles was never out of health all the last two years and a half of his life. He was beheaded on January 30, 1649.

Harvey, meanwhile, was living, as Ent tells us, near London, probably sometimes at Roehampton with Eliab, and sometimes at Combe with Daniel.† In 1650 he was given a pass to go to London to see his old patient, Lady Thynne, who was on her deathbed, and she had to guarantee that he would do nothing to the prejudice of the Commonwealth. Harvey was not of the make of a conspirator, but the Government were just then exceedingly frightened by the Prince's dealings with the Scotch, and in February, 1650, had passed an Act ordering all suspected persons, Papists, soldiers of fortune and delinquents, to leave London by March 20. It was just at this time that Lady Thynne lay dying. In this year occurred the interview with Ent which resulted in the publication of the "De Generatione."

Harvey was, of course, reckoned as a delinquent, in spite of his having acted under the sanction of Parliament, and Lloyd[24] states that he was fined £2000 on this ground.

It is uncertain when he obtained permission to live in London again. He had no home of his own, but when in town lived at the great mansion, Cokayne House in Broad Street, which Eliab bought in 1654. Howell, however, addressed a letter to him, probably before this date, at Laurence Pountney Hill where the Harveys had their house of business. But he also spent his time partly at Roehampton and partly with Daniel's widow at Combe or Lambeth, for he left house linen of his own there as well as in London.

---

* Wetherborn was a Scotchman and was in the carriage with Bacon when Bacon caught the chill which caused his death.

† Eliab and Daniel were brothers of William.

A year later began that great benefaction by which the College hitherto somewhat unmindful of its greatest Fellow, was driven at last, though somewhat tardily, to recognize his merits.

On July 4, 1651, at an Extraordinary Comitia:

"Postremo Dns Praeses a schedulâ (written scheluda) legit in haec verba, quae αὐτολέξει hic inseri jussit."

The President evidently read from a sheet of paper without adding the signature, or letting Hamey, then Registar, see it. What he read was as follows:

> If I can procure one that will build us a Library and a Repository for Simples and Rarities, such a one as shall be suitable and honourable to the College, will you assent to have it done or no, and give me leave and such others as I shall desire, to be the designers and overlookers of the work both for conveniency and ornament?

The offer was unanimously accepted.

Harvey paid for the Museum, and gave a large donation of books not only on medicine, but also on geometry, astronomy, music, optics, natural history and travels. It was formally opened on February 2, 1654, when Harvey gave the President all the title deeds and other papers connected with the property.

At the next election, Michaelmas, 1654, the College elected Harvey President. He was absent, and when his election was conveyed to him by Alston and Hamey, declined the honor in very courteous terms, alleging his old age and ill health, and begged them to re-elect Dr. Prujean, which they did.

Harvey, however, consented to take office as Conciliarius, and was reappointed up to his death.

In 1656 he resigned his Lumleian Lectureship, which he had held for forty years, and at the same time made over to the College lands in the parish of Burmarsh in Kent, then valued at £56 per annum, which he had inherited from his father. He charged the revenue with an honorarium to be paid for a yearly Oration to commemorate College benefactors, and to inculcate the necessity of experiment, with provision for an Annual Feast, and with a salary for the keeper of the Museum and Library. The Harveian Oration and the Harveian Dinner are still held, and the Librarian is still the Harveian Librarian, but though the College still owns the land, the funds have now to be supplied chiefly from other sources, and of the Library which the College possessed only 140 volumes were saved at the Great Fire. All the rest were burned.

Harvey died of cerebral hemorrhage, at Roehampton, in the eightieth year of his age, on June 3, 1657. His body was carried first to the Broad Street house, and thence was transported on June 26 to the family vault at Hempstead Church, Essex, being escorted out of the City by a large body of the Fellows of the College.

The vault now contains about fifty of the Harvey family, each body wrapped in lead, usually without any wooden coffin. Harvey himself was thus buried, but in 1883, the lead wrapping having cracked, and the conditions become unseemly, the remains were ceremoniously removed to a marble sarcophagus erected by the College of Physicians in the Chapel above.

The "De Generatione Animalium" contains the work of Harvey's later years. He contemplated writing a larger work of the same kind including insects, and refers to it more than once. But he had lost all his notes on insects when the mob sacked his house in 1643, and the design, in common with others, was never carried out.

The "De Generatione" does not, like the "De Motu," lead to any conclusion of a practical kind, and for that reason has never excited the interest of the earlier work, but to my thinking it is the more interesting of the two. It is a mine of information, and it embodies a view of development which was then completely new, but is that now generally held.

The book opens with a preface urging the importance of personal observation, against which no authority, not even the writer's own, should be weighed.

He then selects the common fowl and its egg as the example by which he means to illustrate the stages of generation. The first thirteen chapters are taken up with a careful anatomical description of the external and internal parts of the fowl, interspersed with continual observations on the natural habits of all kinds of creatures, mammals, birds, fishes and insects, and on the various ways in which they propagate their species.

At Chapter XIV begins an accurate record of the changes which can be seen to occur day by day in the hen's egg, when watched through a lens in a basin of silver (by which the light was reflected and made to illuminate the preparation).

The changes are recorded daily for the first week, and at longer intervals up to the hatch, and with these observations, as with the former, are mingled copious notes of animal life, always interesting, and sometimes delightful for the quaintness of the English version.

> And if you listen close for some days before exclusion [hatching] you may perceive the chickens kick, make a noise, and cry after their manner, which kind of commotions when the sitting henne discovereth in her nest, she removeth the egges and rowleth them to and fro (as carefull mothers do their disquiet and peevish infants in the cradle) till the chickens being accomodated with convenient posture, lye hushed and still. . .
>
> The yolk is now concluded in the Abdomen between the Guts; and that not onely while the chicken remaines in the eggs, but also when he is excluded, when he walkes abroad with his Mother to seek his provision . . .

Throughout, Harvey has professed that Aristotle is his leader and Fabricius his "Praemonstrator," and though he occasionally corrects Aristotle he more often corrects the criticisms passed upon Aristotle by Fabricius.

After he has traced the chick to its hatching he turns to the metaphysical problems which arise out of it. He discusses the different senses in which one thing can be considered the cause of another, and debates whether the cock or hen or both can be called the efficient or material cause of the egg, or the egg of the chick.

Here we begin to understand why Bacon had such an aversion to Aristotle. Such questions as these have lost all interest to us, and Bacon was sufficiently modern in his outlook to see that how a thing happened was of much more importance, at any rate in matters concerning life, than why it happened.

Harvey, who is a genuine disciple of Aristotle plunges into metaphysics with all his master's fervor. He is, however, driven at last to confess that the father and mother are nothing more than instruments, and that the efficient cause of life, or the soul, or the individual, whichever way it is considered, can only be referred to God Himself.

Of secondary causes the soul or principle of life resides not in the heart but in the blood.

From Chapter LXIII to Chapter LXXII he describes the conditions in the vivipara, represented chiefly by man and the deer, in the same order and method as he had those of the ovipara, and these descriptions again are made extremely interesting not only by the accurate accounts which he gives of the habits of deer and other animals, but also by a wealth of pathological details drawn from his experience as a medical practitioner. Finally there are some sections on obstetrical practice which are full of sound observation and advice.

It must be allowed that all Harvey's speculations are vitiated by a fundamental mistake. Aristotle and all ordinary physicians believed that both male and female parent made some material contribution to the embryo. But Fabricius denied it and so did Harvey. He could not see any material left by the cock in the hen's ovary, and therefore he refused to allow that there was any.

He was driven to such straits by his scepticism that he even suggested that the conception of the egg in the ovary of the hen might literally be paralleled by the conception of the εἶδος or mental image in the brain of the painter.

In the "De Motu," when he came up against a fact that was beyond his powers, such as the communication between the minute arteries and veins, he made a guess which though not quite accurate produced a workable theory. Here, however, he refuses to accept the guess that had seemed reasonable to others. The result of this error has been that the "De Generatione" has been decried, and that nearly all opinion has ascribed Harvey's merit to the "De Motu."

But this is a very erroneous view.

In the first place the observations upon the development of the chick in the egg are the first reliable statement of the facts. Harvey saw the small white spot or cicatricula, realized that it was the starting point of the chick, and traced its gradual development in words which are true to this day. No one had done that before, and Fabricius had made statements that were entirely erroneous.

Secondly, and this is an even greater title to fame, Harvey was the first person to formulate the theory which we now hold, that development is a process of gradual differentiation from an originally homogeneous mass, without any addition from the outside. This was the hypothesis advocated in what Huxley calls "that remarkable work which would give Harvey a claim to rank among the founders of biological science even had he not been the discoverer of the circulation of the blood."[25] Harvey called the process Epigenesis.

The opinions that Harvey wished to disprove were those held by the ancients that growth took place by the accretion of outside bodies, whether elements or atoms. Secondly, he wished to distinguish epigenesis from another kind of generation which he called metamorphosis, and exemplified by the birth of insects, which either with or without the pupal stage, are as he thought produced with their parts ready made instead of gradually growing out of a homogeneous jelly.

It is a curious thing that the whole of the 18th century was devoted to disproving Harvey's theory, and to showing that from the very first the ovum contained the perfect being on a minute scale, and that this doctrine obtained then the name of the theory of development or evolution. Though Wolff denied it in 1759, his work passed unheeded, and it was not until the 19th century began that Harvey's doctrine was reestablished. We now believe what he taught, though the theory has taken the very names which his opponents used for their own.

(*To Be Continued*)

MEDICINE IN A POPULAR MEDIEVAL ENCYCLOPEDIA

By JAMES J. WALSH, M.D., PH.D.

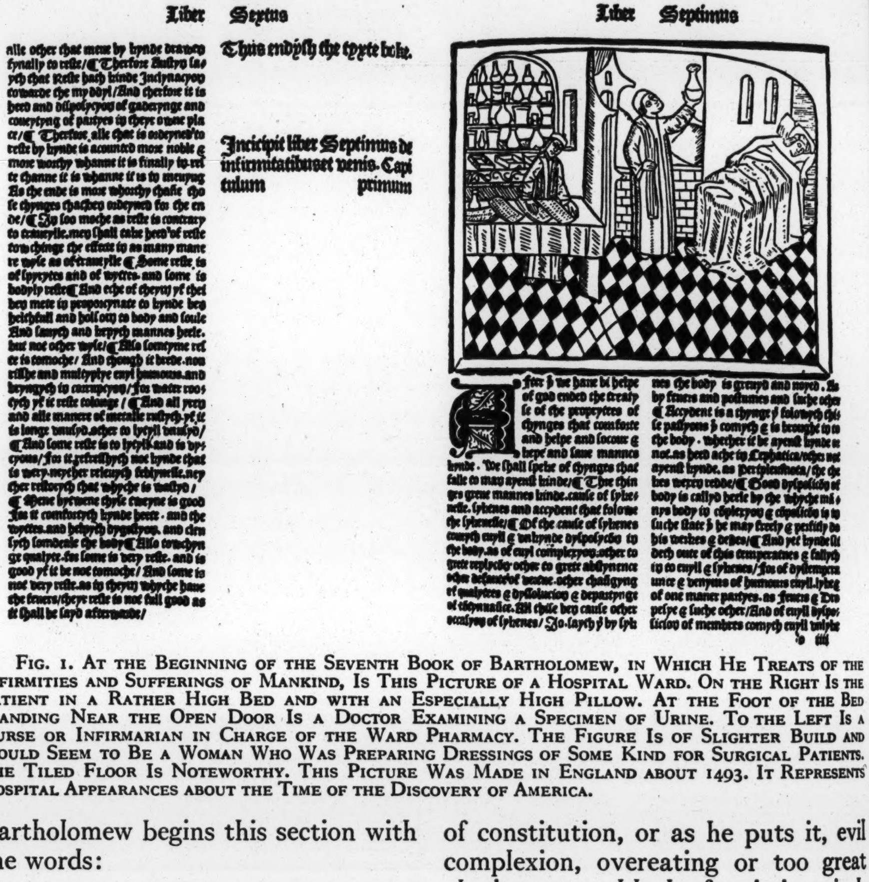
NEW YORK, N. Y.

THERE used to be a very definite impression that medical practice in the Middle Ages was so thoroughly unscientific, above all so lacking in the important element of close clinical observation as to be almost completely without serious interest for the modern time. The medieval physicians were supposed to be ever so much more interested in their books than in their patients. The recently awakened interest in the history of medicine has contradicted impressions of this kind rather thoroughly. With the increase of actual knowledge of the writings of the professors at the medical schools of the Middle Ages, together with the popular works on science and medicine issued at that time most of them reprinted early in the history of printing, it has come to be realized that there was much more of direct close observation of disease and the study of patients than we had any idea of until the consultation of these old historical documents relating to medicine became so common.

There still remain many of these old books relating to medicine to be collated but each advance in this direction has been followed by increasing admiration for the work of these medieval scholars who were devoting themselves to the gathering of information and the making of observations.

One of the books that has been most valuable in bringing about this changed attitude toward medieval writers is Bartholomew's—Bartholomeus Anglicus as he is called in the Latin translation of his name,—"De proprietatibus rerum" (The Properties of Things). It was undoubtedly the most read book after the Bible in the later Middle Ages. All the important libraries in Europe contain a number of manuscript copies of Bartholomew showing how popular the work was among medieval readers. With the invention of printing it was one of the works most frequently printed. The *editio princeps* was printed by Caxton at Cologne in 1472. No less than ten editions of the original Latin were published before 1501 but there were also four French translations besides one each in Dutch, Spanish and English. The English edition was printed with Caxton's types by his successor, Wynkyn de Worde, and a finely preserved copy of that is in the New York Public Library where, through the kindness of Mr. Wilberforce Eames, the well known bibliographer, I have had the chance to study it and to have some photostats made of it. This is a fine black letter edition in old-fashioned English, rather difficult to read at first, but one grows accustomed to the old time spelling and some of the abbreviations and certain special modes of expression and then it is comparatively easy.

The most interesting section of Bartholomew's book is that in which he treats of medicine and disease. At the beginning of it in the English edition, there is an illustration of a hospital ward with a patient in bed, a doctor examining a specimen of urine, and the ward pharmacy. The well-stocked shelves of the pharmacy and the tiled floors are noteworthy.



Liber Sextus

Thus endysh the syxte boke.

Incipit liber Septimus de infirmitatibus et venis. Capitulum primum

Liber Septimus

FIG. 1. AT THE BEGINNING OF THE SEVENTH BOOK OF BARTHOLOMEW, IN WHICH HE TREATS OF THE INFIRMITIES AND SUFFERINGS OF MANKIND, IS THIS PICTURE OF A HOSPITAL WARD. ON THE RIGHT IS THE PATIENT IN A RATHER HIGH BED AND WITH AN ESPECIALLY HIGH PILLOW. AT THE FOOT OF THE BED STANDING NEAR THE OPEN DOOR IS A DOCTOR EXAMINING A SPECIMEN OF URINE. TO THE LEFT IS A NURSE OR INFIRMARIAN IN CHARGE OF THE WARD PHARMACY. THE FIGURE IS OF SLIGHTER BUILD AND WOULD SEEM TO BE A WOMAN WHO WAS PREPARING DRESSINGS OF SOME KIND FOR SURGICAL PATIENTS. THE TILED FLOOR IS NOTEWORTHY. THIS PICTURE WAS MADE IN ENGLAND ABOUT 1493. IT REPRESENTS HOSPITAL APPEARANCES ABOUT THE TIME OF THE DISCOVERY OF AMERICA.

Bartholomew begins this section with the words:

> After we have by the help of God ended the treatise of the properties of things that comfort and help and succor and keep and save mankind, we shall speak of things that fall to man against his kind [nature]. Three things grieve mankind. They are, conditions that lead to sickness, sickness itself and accidents that follow the sickness [complications and sequelae].

Bartholomew seems to have realized that the predisposition to disease was an extremely important element, and so he gives it a place beside disease itself and its complications and sequelae. Among the things that predispose to disease he counts delicacy of constitution, or as he puts it, evil complexion, overeating or too great abstinence, and lack of resistive vitality which he calls defective virtue, that is strength of body. All these are the cause or occasion of sickness.

Bartholomew then ventures upon a definition of health which almost needless to say is not readily defined. His effort runs:

> Good disposition of body is called health, by the which man's body is in complexion and composition [in constitution and makeup] such that he may freely and perfectly do his work and deeds.

The old medieval encyclopedist felt that so long as a man could "freely and perfectly" keep up his occupation he was in good health no matter what his feelings might be.

The most interesting capitulum in this section is undoubtedly Bartholomew's description of madness or insanity. When this paragraph was published some forty years ago in "Medieval Lore," a set of classified gleanings from the encyclopedia of Bartholomew[1] it attracted a great deal of attention, for it did not seem possible that anyone could have secured so firm a grasp of this complex subject, insanity, as Bartholomew exhibited in his few brief sentences. He said:

> Amentia and madness is all one, and Plato sayeth that madness is infection of the middle cell of the head with privation of reason as Constantine sayeth in his book on melancholy. Melancholy is an infection that hath mastery of the soul, the which cometh of dread and of sorrow. And these affections are diverse, for there is madness that is called inania, and madness that is called melancholia, the result of diverse grieving and hurting from overwork. For inania principally the imagination is hurt, and in the other reason is hurted [*sic*], and these passions come sometimes from melancholy meats and sometimes from the drink of strong wine which burneth the humors and turneth them into ashes. Sometimes these affections come from passions of the soul as of business and deep thought, of sorrow and of too great study and of dread. Sometimes from the biting of a mad dog or of some other venomous beast, sometimes from corrupt and pestilential air, that is infection, and sometimes from the malice of corrupt humors which hath the mastery in the body of a man to breed such a sickness. [The humoral theory of disease, of course, prevailed at this time.] And as the cause is diverse, the tokens and signs are also diverse. For some cry and leap and hurt and wound themselves and other men [mania] and some darken and hide themselves in privy and secret places [melancholia].

As to how they are to be treated, Bartholomew has it:

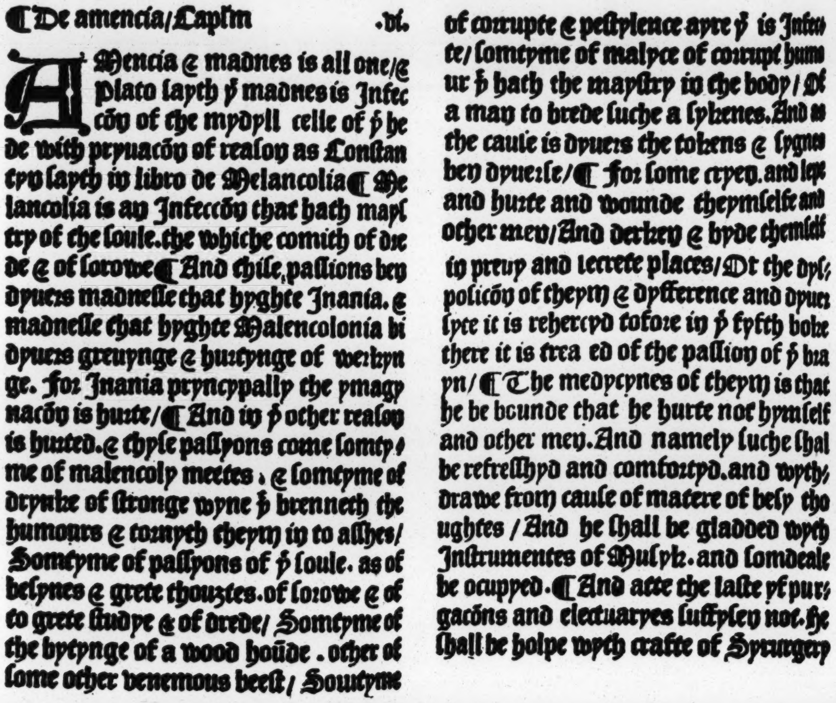
> Of the disposition of them and the difference in diversity, it is rehearsed before in the fifth book wherein is treated of the passion of the brain . . .
>
> The medicine [treatment] of them is that they be bound, that they hurt not themselves and other men and namely such patients shall be refreshed and comforted and they must withdraw from cause of matter of busy thoughts and shall be gladded with instruments of music and some deal be occupied.
>
> And at the last if purgations and electuaries prove unavailing they shall be helped with craft of surgery.

Bartholomew picks out exactly the causes of insanity which we dwell on in the modern times—overwork, overstudy, over-sorrow, dreads and preoccupation of mind with serious thoughts. He knows also the infectious causes of insanity, the biting of a mad dog or other venomous beast and he dwells on overeating and drinking of strong wine. His treatment is the best part of his paragraph: the insane must be withdrawn from cause and matter of dread and busy thoughts, that is, get them out of the environment that fostered the disease. "And they must be gladded with instruments of music and some deal be occupied." Here are the entertainment and occupation cures which we have been inclined to think of as being so very modern in their origin and surely not traceable back to the middle of the thirteenth century.

---

[1] Robert Steele, London, 1893.

Very probably the most interesting feature of Bartholomew's very complete description of insanity in so brief a space is that he has nothing to say about possession by spirits. It has been the custom for writers on insanity generally to suggest that before our modern time, that would be until the last century or so, the generally accepted cause for insanity by physicians as well as ordinary people was possession by the devil. This unfortunate attitude of mind is said to have led to the neglect of the insane and sometimes to the using of very severe measures in their treatment. Bartholomew, writing for the clergy particularly, has nothing to say of possession by spirits. As a matter of fact, possession by spirits came to occupy a prominent position only after the witchcraft delusion made its way through Europe. That of course was in the sixteenth and the seventeenth century. In the Middle Ages it was believed that occasionally patients exhibiting symptoms of madness were possessed by the devil but this was infrequent, so infrequent that Bartholomew leaves it out of his etiology. Bartholomew's insistence on entertainment and occupation of mind shows how sane he was in this matter, but also how thoroughly sane was the feeling generally



¶ De amencia/Caplm .vi.

Amencia ⁊ madnes is all one/⁊
plato ſayth ẏ madnes is Infec
cōn of the myddyll celle of ẏ he
de with pryuacōn of reaſon as Conſtan
tyn ſayth in libro de Melancolia ¶ Me
lancolia is an Infeccōn that hath mayſ
try of the ſoule. the whiche comith of dre
de ⁊ of ſorowe ¶ And thiſe, paſſions ben
dyuers madneſſe that hyghte Inania. ⁊
madneſſe that hyghte Malencolonia bi
dyuers greuynge ⁊ hurtynge of werkyn
ge. For Inania pryncypally the ymagy
nacōn is hurte/ ¶ And in ẏ other reaſon
is hurted. ⁊ thyſe paſſyons come ſomty-
me of malencoly meetes, ⁊ ſomtyme of
drynke of ſtronge wyne ẏ brenneth the
humours ⁊ tornyth theym in to aſſhes/
Somtyme of paſſyons of ẏ ſoule. as of
beſynes ⁊ grete thouztes. of ſorowe ⁊ of
to grete ſtudye ⁊ of drede/ Somtyme of
the bytynge of a wood hoūde. other of
ſome other venemous beeſt/ Somtyme
of corrupte ⁊ peſtylence ayre ẏ is Infec
te/ ſomtyme of malyce of corrupt hum
ur ẏ hath the mayſtry in the body/ Of
a man to brede ſuche a ſykenes. And as
the cauſe is dyuers the tokens ⁊ ſygnes
ben dyuerſe/ ¶ For ſome cryen. and lepe
and hurte and wounde theymſelfe and
other men/ And derken ⁊ hyde themſelf
in preuy and ſecrete places/ Of the dyſ-
poſicōn of theym ⁊ dyfference and dyuer
ſyte it is rehercyd tofore in ẏ fyfth boke
there it is trea ed of the paſſion of ẏ bra
yn/ ¶ The medycynes of theym is that
he be bounde that he hurte not hymſelf
and other men. And namely ſuche ſhal
be refreſſhyd and comfortyd. and wyth-
drawe from cauſe of matere of beſy tho
ughtes / And he ſhall be gladded wyth
Inſtrumentes of Muſyk. and ſomdeale
be ocupped. ¶ And atte the laſte yf pur-
gacōns and electuaryes ſuffyſen not. he
ſhall be holpe wyth crafte of Syrurgery

Fig. 2. The Actual Text of the Old-fashioned English Translation of Bartholomew as It Appeared in the Edition of 1493. It Is Not Easy to Read Until You Get Used to the Curious Spellings and the Phraseology as Well as Some Quaint Modes of Expression. There Is a Distinct Satisfaction in Working Out the Meaning of the Original and after Some Study It Becomes Comparatively Easy to Read, Much Easier than Chaucer.

in his time. What he means by the expression when medicines fail "the patient shall be helped with craft of surgery" we do not know. There was supremely great surgery in the thirteenth century but that developed after Bartholomew's time. That last phrase of his with regard to surgery for insanity is very thought-provoking.

Besides madness Bartholomew recognized frenzy or delirium. He said that it was mainly due to fever and "the symptoms of it were discolored urine during the fever with disturbance of mind (woodness) and continual wakefulness and restlessness with casting about of the eyes, stretching and casting of the hands, moving and wagging of the head, and grinding and knocking together (gnashing) of the teeth." He warns that the patient may attempt to arise from his bed so that he must be guarded and "sometimes the patient sigheth and now he laugheth and now he weepeth and biteth gladly and wanteth his warden and his leech. Seldom he is still but he crieth much. This is a most perilous sickness but he knoweth not that he is sick."

As for the treatment, it must be prompt by both diet and medicine. "The diet shall be full scarce, as crumbs of bread oft washed in vinegar, and the patient must be well held or bound in a dark place. All that are about him shall be commanded to be still and to be silent, and his nice (foolish) words must not be answered." There was venesection,—if his age and strength suffereth,—from the cephalic vein. The head should be shaven and plastered with the lungs of swine or of a sheep. The forehead should be anointed with the juice of lettuce or of poppy. If the delirium continueth during three days of sleepiness, there is no hope of recovery, but if the urine beginneth to take a good color and the symptoms lessen there is good hope of recovery.

In this book or section on medicine there are some seventy capitula, long paragraphs, treating of a great variety of subjects.

I have given two of them, and will take up three or four more. The titles of the others will suggest something of the immense field of information that Bartholomew covered even in medicine alone. He has a capitulum, for instance, on sciatic gout (gutta sciatica); on the arthritic passion, that is inflammation of the joints, followed by one on gout (podagra). There are capitula on abscess, on ulcer, on pustula, as well as on scabies. There are capitula on continuous fever, simple and complicated, and on acute fevers, simple and complicated. There is a paragraph on sighing but also on vomiting and on pain in the stomach. There are several capitula on quotidian, tertian and quartan fever. There is a capitulum on polyp with fetor of the nose, so that there was ozena also in those days. Indeed Bartholomew has a good deal to say about *fetor in ore* (halitosis) and how to relieve it. There is a capitulum on deafness and its causes, on defective sight and on glands, also one on involuntary tears and over forty others on all sorts of medical topics.

In the second and third capitula Bartholomew treats of headache, its causes and symptoms. He quotes Constantine Africanus who had been the great teacher and writer on medicine down in Salerno in the eleventh century that headache is due to something either within the head or without. The most frequent cause of headache is the stomach. He quotes Galen as to the four parts of the head in which the ache may be felt with a different cause for each part, and his last words are the headache comes as Galen describes but also in other manners, "as of the sharpness and effect of strong wine. The fumes thereof pitcheth and disturbeth the small cells of the brain and breed great disease (discomfort in the head)."

The third capitulum is on the remedies and treatment of pains and aches in the head.

> The head is grieved with an ache that physicians call emigramma [migraine]. Constantine sayeth this ache and evil is most grievous, for who that hath it feeleth in his head as it were the beating of hammers and he cannot bear noise, neither can he stand light nor shining objects.

In connection with the headaches, Bartholomew takes occasion to treat of various scalp troubles:

> The head is grieved especially on the outside in the skin with pimples and scabs out of which cometh matter much like to honey, and therefore Constantine calleth such a scab *favum*, or honeycomb, for such sores have small holes out of which matter cometh as honey out of a honeycomb. This disease is due to vicious humor which cometh to the skin of the head and breedeth there in pimples and whelks . . . Also the head is diseased often with a familiar affection that affects children particularly and we call that evil *tinea*, that is a moth, for it fretteth and gnaweth the over part of the skin of the head as a moth that fretteth clothes and cleaveth thereto without departing and holding the skin right fast, and such an evil breedeth passing great itching and fretting and clawing. Of that itching fall many scales . . .
>
> This evil cometh oft to children of great plenty of blood and delicacy of skin and plenty of meat and drink. Constantine saith that meat and drink ought to be withdrawn from such children and to have them but moderately. Then when the humor is avoided there ought to be applied thereto ointments and other remedies.

Bartholomew suggests a special treatment for this tinea or ringworm when it occurs in suckling children. It would remind one somewhat of autovaccines:

> The best remedy is to let the blood in the veins behind the ears and annoint the sore place with the same blood while it is hot. This opens the pores and entereth and wasteth and destroyeth the matter, and because that often these scales cling to the roots of the hair, the disease may not be easily cured and healed unless the matter is first drawn out of the head right by the root, and if this disease and malady is chronic only with difficulty may it be healed and cured. When the disease has been chronic, baldness is left and is seen always afterwards.

Bartholomew treats of baldness in another book the fifth in the chapter on the hair, and begs his readers "look there indulgently." His mode of expression is interesting because there has been question in recent years as to whether the peremptory "turn to page so-and-so" is not something of an impertinence. Bartholomew has something to say, moreover, of "the scales which the roots of the hair breed like to bran" and he evidently knew about dandruff. He says: "But this uncleanness must busily be helped with cleansing, washing and with medicines for lice and nits and small worms must be voided out of the head by needful medicines."

The general treatment of headache is to let blood in the vein that is called the cephalic and cleanse the body with suitable medicines and purgations and if the headache seems to be from the matter that is within the stomach, it is needful to make the patient vomit and bring out the matter with suitable medicine. When the body is cleansed and purged, then men should pour warm water on the head, the hands and feet, to open the pores so that the humor that is causing the headache may more easily pass out of the body. He quotes Constantine as suggesting that it is good to bandage the legs low down so that the humors that are the cause of the headache may be drawn downward to the nether parts while if the forward part of the head ache we must cause the nose to bleed. If there is fever:

> . . . we shall help with cold medicines and moisture of the temples and nostrils and apply to the veins and pulses water of roses and milk of a woman that feedeth a male child and labor to bring the patient to sleep . . . If the ache cometh from too great repletion of meat or of drink as it fareth in drunken men, then the best remedy is to have him drink hot water in great quantities and then in a little while after busy him for to vomit.

Bartholomew has a very interesting brief paragraph on insomnia. We are sometimes inclined to think of wakefulness as being a modern affection consequent upon the stress and strain of a strenuous life in our modern time and probably would not be inclined to think of it as calling for much attention in the Middle Ages. Bartholomew's paragraph will prove disillusioning in this regard. He sets down wakefulness or insomnia as a disease (an evyll) of the brain opposite to lethargy. He attributes it to overuse of the brain though it may be due to fever or to salt humors. There has been question in our time whether the tendency to insomnia in some patients might not be due to the excessive use of salt. It has even been suggested that table salt should be replaced by sodium bromide in the salt cellar of insomniacs. The old medieval encyclopedist takes up first the more serious forms of insomnia and declared that as the result of prolonged wakefulness, inordinate waking, is his term, "anguish states might follow, a patient's color change, and his busy thoughts increase even up to raving and unreasonable suspicion." These symptoms were in connection with his fever states, but evidently also Bartholomew had noted the insomnia that so often occurs at the beginning of insanity. He suggested the annointment of their faces and temples with substances that breed sleep; wild lettuce and poppy were good for this purpose. He also said that "Woman's milk is good to bring them on to sleep" though he did not say whether it was to be used internally or externally. He says emphatically, "The body shall be fed with good meats," that is the diet should be abundant. He had evidently seen or read of insomnia produced by failure to eat enough as a good many others have seen since his time.

Bartholomew's paragraph with regard to dizziness or vertigo is interesting because he attributes that to a cause within the head or to the stomach. The first may be serious. "The patient feeleth heaviness in the head, noise in the hearing and corruption in the smell, and such giddiness passeth not easily." Bartholomew would seem to have known something of ear vertigo (which used to be called Menière's disease) and its obstinacy to treatment. "Stomach giddiness or vertigo cometh and goeth." Evidently he felt that there was a good prognosis for it. For treatment he suggested a hot footbath with venesection and purgative medicines. The patient must be sparing in the use of wine and he must avoid bloating meats and grease, "and vomiting should be encouraged for it is full good."

Bartholomew has a curious rather long paragraph with regard to epilepsy or the falling sickness. He says that the older doctors used to call the falling evil "the little apoplexy" though they also dubbed it "the children's evil," because children so often suffered from it. His description of an attack runs:

> He that hath this evil falleth suddenly. The mouth is set awry and aside, the face is also twisted, with convulsive movements of the head and neck as well as of the body and with strong biting and fast closing of the teeth and foaming at the mouth and outputting of many superfluities.

By this last expression Bartholomew seems to mean the involuntary letting of the excretions.

We are still in the dark with regard to the cause of epilepsy. Bartholomew suggests that some of it is due to the brain and some to the members and some to the stomach. He has three different names: epilepsy comes from the brain, analempsia from the stomach and cathalempsia from the outermost parts in the hands and feet and is known by its own signs. They that are possessed with that evil, cathalempsia, know when the evil cometh on them for they feel a manner of itching as if by the annoyance of ants (formication) or a movement of some kind the result of the matter that cometh upward. These patients are often able to protect themselves from falling.

Bartholomew felt that the sensations which represented the warning of the coming of their attack and which we speak of as the aura, gave these patients sufficient time to guard against falling. Bartholomew was quite sure that the moon had something to do with the periodicity of the attacks of epilepsy, only he thought the different kinds of epilepsy were differently affected. If the epilepsy cometh of melancholy, that is of physical depression with loss of weight and the like, it causes most disturbance in the waning of the moon. If it cometh of blood or phlegm, that is plethora or disturbance of the lungs with expectoration, it showeth itself most in the fullness of the moon. Even in recent years those most in contact with epileptics have been inclined to say from time to time that the moon had some effect on epilepsy and the periodicity of the attacks, just as some distinguished physiologists of our time have been inclined to think that menstruation was influenced by the moon.[1]

On catarrh or flow from the head Bartholomew has some interesting remarks. He divides it into two kinds, that which comes from cold and that from hot air. The one is the ordinary winter cold in the head, the other what is called summer catarrh or hay fever though he did not have those terms. If the flow from the head comes from dissolving heat, "these be the signs and tokens: the face is red with a red nose and red veins in the running eyes. Cold of the winter time brings on pallor to the face, the tears are cold and not hot, and cold is felt deep within." Summer catarrh was to be treated with the application of balm to the nose, or a decoction of roses, and the holding of roses to the nostrils. No attempt should be made to block the running from the nose for that would cause the running to be more. For the winter colds he recommended the use of laxatives but also laudanum. After all we have advanced very little on that treatment, and what little advance has been made has come mainly in the twentieth century with the possibility of anti-pollen serum and perhaps autovaccine.

---

[1] Note: The connection between the moon and disease was accepted as thoroughly at that time as the connection between the moon and the weather is for a great many people in our time, though the meteorologists refuse to accept any connection between the two. In spite of this, farmers and sailors, the two classes of people whose occupations are most affected by changes in the weather, are firmly convinced that there is a very close connection between the moon and the weather and they will proceed from the appearance of the moon itself and of the clouds around it, to make prognostications with regard to the weather for several days ahead.

Bartholomew's capitulum on stupor and lethargy shows that he had seen something of what we call sleeping sickness. He says:

> Stupor cometh in two manners, of perturbation of reason or superfluity of humor that stoppeth and letteth [hinders] the ways of the spirits as happens in drunken men. It may come from cold as fareth with them that have been frozen in ice or snow. Also it cometh of complexion of the whole brain as happens in apoplexy or diseases that take away meaning and feeling, as happens in lethargy, the sleeping evil [sickness]. This occurs often in old men and in winter cometh from accumulation of phlegm. It cometh never of itself but always of some former sickness.

On the other hand Bartholomew had seen the stupor or lethargy of hysteria-catalepsia. For this he suggested that the patient's face be often washed with cold water and the feet rubbed often under the soles and that stinking things smoking be put to the nether parts as guts, burnt horn and such like. If these did not suffice, the patient was to be shaken by the hair of his head or by his beard. Above all things the patient should have a clyster and smelling should be excited. The head must be shaved and rubbed with things that open the pores and annointed with mustard and other like things. The hysteria patient was given as severe treatment as the French prescribed for some of the shell shock cases during the War when they recommended faradic electricity.

Bartholomew has a really striking paragraph on rest. He insists that there should be mental rest as well as bodily rest—rest of the wits as well as rest of the members. Rest might be readily abused, however, and rest cures were not always to be commended. He does not hesitate to go so far as to say, "Sometimes rest is too much, and thus it breeds, nourishes and multiplies evil humors and bringeth to corruption, for water rotteth if it rest too long." He reminds us that:

> . . . all iron [the English edition spells the word "yren"] and all manner of metals rusteth if long unused or too little used. . . The mean between these twain, too much and too little rest, is good, for it comforteth nature's health and the wits and health and digestion and cleanseth some deal the body.

Bartholomew would probably agree with that modern expression which I believe we owe to the English clinicians that rest may be a dangerous remedy, as dangerous as opium though as valuable as opium. Both are to be used with circumspection and with proper regard to the individual patient.

Bartholomew's advice to physicians in the care of their patients is very interesting and much more modern than one would think it possible to be. He says that "a good physician takes heed to the matter of the evil," that is the kind of the disease present, "but also of the might and strength of the patient and therefore he varieth his medicine." Bartholomew seems to have reached some such state of mind as that which Osler attributed to old Dr. Parry of Bath that it is quite as important to know what sort of patient has a disease as what sort of disease a patient has. He certainly emphasized the idea that it is more important to treat the patient than his affection. Bartholomew went so far as to say, and he quotes Hippocrates in support of his assertion, that "if medicines do not do good they are likely to do harm. When they fail to be effective they grieve [discourage] the patient."

There is scarcely a subject in medicine on which Bartholomew touches with regard to which he does not make remarks which show that he has been reading writers on medicine whose opinions were founded on clinical observation. Some of his discussion of medical topics is surprisingly modern when his quaint old-fashioned expressions are translated into modern terms. His therapeutics are often quite absurd, but then, as a distinguished French physician said not long ago, the therapy of any generation is nearly always absurd to the next generation. We need only turn to a textbook of medicine of fifty years ago to have that exemplified for us rather strikingly. About the middle of the nineteenth century and a little later, they were using whiskey and brandy in large quantities for all the continued fevers and tuberculosis as well as for pyemia and septicemia and getting wonderful results.

Bartholomew was not writing a family medical book but was trying to impart information on medical subjects that would enable even those who knew nothing of medicine to understand the meaning of disease, its symptoms and treatment as diagnosed and prescribed for by physicians who knew what the best medical writers had written in the matter.

Bartholomew's book was written for a very definite purpose. He set himself the task of supplying such information for parish priests and confessors as would enable them to answer the questions put to them by members of their flock and by their penitents. In our day one of the most interesting departments in many periodicals is that of "the question box" in which are to be found replies to all sorts of questions serious and ridiculous. Bartholomew must have been read very widely, and had besides a faculty for imparting information in brief form readily to be understood. Hence the popularity of his book not only in his own thirteenth century in manuscript form when the difficulty of making copies was so much of a handicap, but during the succeeding centuries until the invention of printing when, as I have said, it was the most printed book after the Bible, and then for a full century after that until nearly the end of the sixteenth.

What it represents at the present time is the best possible source of definite information with regard to medical diagnosis and practice and particularly the treatment of disease as these developed about 700 years ago. The surprise is to find how much there is that is of very definite interest even at the present time.

ST. PHILIP'S HOSPITAL IN CHARLESTOWN IN CAROLINA

MEDICAL CARE OF THE POOR IN COLONIAL TIMES*

By JOSEPH IOOR WARING, M.D.

CHARLESTON, S. C.

BY 1696 the frontier town of Charlestown, having attained its twenty-sixth year, had found need for a law[1] providing for the relief of its accumulating poorer class of citizens. This early law was renewed two years later, but by 1712 had proved inadequate and was replaced by an "Act for the better Relief of the Poor of this Province,"[1] which directed that the vestries of the several recently established Parishes each nominate two overseers of the poor who should work with their respective wardens in giving relief to the indigent. Funds raised by a property tax levied and collected by the vestries were to be used for this purpose, and the text of the Act stated specifically that the pauper sick were to have the "Assistance of Physicians, and Medicines."

Just how this medical care was administered in the early days of the town is not recorded. The Account book of St. Philip's vestry[2] notes a payment (1729) of £120 to Doct^{r} Cooper's order. In 1732 Doct^{r} Kilpatrick, evidently the gentleman of inoculation fame, was paid a bill of £133, and again the next year received settlement of his account, as did Dr. Moultrie and Dr. Turner in 1734. The following year Dr. Turner's "years salairy £100" was paid, with £15 extra for his "Extraordinary trouble about Codner's legg," and from this it may be inferred that a physican had been employed under a definite contract to care for the sick poor of the parish, which in those days included all of the town.

No mention of hospital facilities is found in this account book, but elsewhere there is note of a pesthouse on Sullivan's Island which was erected by 1712, and probably some time before.[3] Evidently the Parsonage House of the parish was occasionally used as a hospital, for there are records of smallpox cases isolated therein,[4] and the complaint of a French minister at Saint James, Santee, is witness to the burden which was apt to be imposed on the clergy by the sick of the province. He says:[5] "I am obliged without charity to assist the sick poor people and to keep physic to cure her. Some time there be at my charge two months before she recovered her health." In early Charlestown it was customary to provide for sick persons in private homes, whose owners were paid an agreed sum for lodging, feeding, and nursing the unfortunates.

By 1732 the town had grown to include some five or six hundred houses, even though they were "clumsy and miserable huts . . . of clap boards, plastered with lime within, made from oyster shells," according to a later writer. Now a period of more permanent and presentable building began, and it would appear that at the same time the need for more satisfactory provision for the poor and sick of the community became evident.

---

* Read before the Medical History Club, Charleston, S. C., Nov. 5, 1931.

The Minute Book of St. Philip's Vestry shows that on April 9, 1733, "Doct. John Turner was willing to take care of the Poor of this Parish, and look after them for one hundred pounds Curr^{y} money a year," and that he was appointed or reappointed to the position of Parish Doctor. But this arrangement was evidently not adequate, for the next year (Jan. 6, 1734) the minutes contained a petition to the governor, asking that he "be pleased to give Leave to bring a Bill for appropriating as much of the square Piece of Ground belonging to the Publick in Charlestown, as may be necessary wheron to erect proper Buildings for the use of a Public Workhouse and Hospital, and for authorizing your Petitioners to Erect such Buildings on the same at their own proper Cost and charge." The petition cited the increasing burden on the parish, and noted that the "Parish Officers are now often obliged to take up with very poor Accomodations of Lodging &c for Sick Persons, and at very extravagant Price, to the great trouble of the said officers, Suffering of the Sick Persons, and enhancement of the Parish charge."

The result of this plea was the passage of an act[7] authorizing the vestry to raise as much as £2000 currency for the current year and £1000 annually thereafter and to build a "good, substantial, and convenient Hospital, Workhouse, and House of Correction" and setting aside for the purpose "One Acre of the Eastermost Part of that Land called *the Old Burying Ground*, lying on the back Part of Charlestown." A warden was to be appointed, and was allowed to take, besides his salary, fees and profits from the inmates or their labour, and to use "fetters or shackles" or "moderate whipping" on the inmates, or to "abridge them of their food" if the necessity arose.

Thus about 1736 this early hospital was established. It was probably a rough frame structure, for later on an act[8] provided for a new building of brick, and referred to the erection of the old building. Whether its medical or its disciplinary feature was most important is not clear, but it was certainly recognized as a true hospital, for in the minutes of the Vestry frequent reference is found to cases sent for treatment. Apparently patients with communicable diseases were not admitted, and in the smallpox epidemic of 1738 the wardens "hired an House and provided proper Attendance for the Reception of all such as are real Objects of Charity."[9]

It would appear that the Hospital was completed in that year, for in November the Vestry ordered all the parish poor to be removed from their several lodgings to the Work House immediately.[6] In 1739 a list of the inmates of the Workhouse shows[6] that there were nine patients, as follows: a man with dropsy, a lame man always in bed, a very old woman, a boy three years old, a young man lame and foolish, a child just weaned, a lame woman and her child, and a pregnant woman. The minutes of other dates note a variety of patients referred to the hospital, e.g., a man with a sore leg, a woman with sore toes, a woman with a sore leg, a poor sailor who had lost a leg and an arm, a woman with the King's Evil, a scorbutic man, a mariner with a venereal disorder, and beside these, many other sick persons were given medical attention and maintenance at their homes or lodgings. The board paid for children under foster mothers was noted as 20 to 30 shillings a week, or as much as forty shillings when wet-nursing was included. For boarding and nursing adult patients the remuneration was about 7 shillings and 6 pence a day, or 40 shillings a week (1735).

The position of Parish Doctor, later known as Physician and Surgeon to the Parish and Transient Poor, was evidently one of some desirability. At least, a number of very reputable names are associated with it. The earliest definitely mentioned was that of Dr. John Turner (1733), who held the title until 1737, when the Vestry gave the place to George Philips, Surgeon. Dr. Philips evidently gave but poor attendance, for in a little over a year's time, he was discharged, and Dr. John Lining assumed the care of the poor. The minutes give the bill for his services during the smallpox epidemic of 1738. It may be surmised that his agreement was different from the earlier contract, for after the bill is itemized, it is noted that "he was to receive two third as p^r Agreem^t made at Vestry," and furthermore, that "he attended many and only bled them finding no occasion for Physick w^{ch} is not charged."

In this year the Hospital was evidently put into use. The next physician mentioned is Dr. Joseph Gaultier, whose salary was £150 a year (1740), and who made the following agreement with the Vestry:

> This serves to acknowledge that I Docter Joseph Gaultier of Charlestown Surgeon have agreed and contracted with Robert Pringle and John Guerard Church Wardens of the Parish of St. Philip's Charlestown aforesaid, that I do hereby Bind and Oblige myself as fully as by any Authentick Obligation whatever, to visit, attend, take proper care of, and supply with good and proper Medicines, the poor of the Said Parish at the Workhouse of St. Philip's Parish aforesaid, for the Sum of One Hundred and Fifty Pounds Current Money to be paid him per Annum.
>
> And in Case there are any Persons that their Distempers require extraordinary attendance and expensive Medicines, such as Salivations &c and If I should be obliged to visit or attend sick Persons that are upon the Parish, and not at the Workhouse, in both such cases, I expect to be allowed for the same, as to the Vestry shall seem reasonable.

To this agreement he held until his death in 1747.

His unexpired term was filled by Dr. David Caw, who resigned and was succeeded by Dr. Frederick Holzendorf.[10] The latter resigned in 1748 and was followed by William Welshuysen, who likewise gave up the position the next year on account of his departure from the province. Thereupon Dr. Lewis Caw became the physician (1749).

The minutes of this date give a minor sidelight on the attitude of the public, perhaps, or at least the Vestry, toward the payment of doctors' bills, for in the case of a poor widow who begged "their charity to pay the Doctors and to pay for a Coffin &c" the laconic statement is made that "the Church warden was directed to give her Five Pounds Currency to pay Mr. Claypoole for the Coffin." Possibly the result of the physician's treatment did not appeal to the vestrymen.

By now the facilities afforded by the Hospital were evidently inadequate. Private enterprise led to the opening of "an Hospital for sick negroes."[11] Its size and success is unknown. Public indignation led to the establishment, under the auspices of the Vestry, of a "public hospital for all sick Sailors and other transient persons," who were to be attended by a matron, assistant nurses, servants, and others.[12] The petition for this act stated that "the harbouring . . . of sick sailors . . . in the several little punch houses in the most crowded and confined parts of Charlestown, hath proved very offensive and injurious to many of the inhabitants . . . by reason of the noisome smells emitted from the said houses" and thus the patients gassed their way into a "convenient house, in an open and airy place," evidently a marine hospital entirely separate from St. Philip's Hospital.

In 1750 Dr. George Milligen applied for the position of Parish Doctor and was appointed with a salary of £180. At this time affairs at the Workhouse seem to have gone awry, for the Vestry was driven to remonstrate with the Commissioners that the Warden had made for himself a very bad reputation with the poor, so that they chose begging to relief at the Workhouse. As a result, reforms were inaugurated and an additional brick building was erected with money collected for stall rent in the Market. A few years later (1754) the Vestry allowed an increase in the money given the inmates, providing especially for bread and beer once a week. About this time the wardens also agreed to apply to the Commissioners for the construction of "an Appartment distant from the Workhouse for the reception of People disordered in their Sence," a building which perhaps represents one of the earlier provisions for the insane.

Dr. Milligen resigned in 1757, and the vestry then obtained the services of Dr. Alexander Garden, but three years later the churchmen were driven to wait on the busy physician "to know if He could not abate something of his Salary as Parish Doctor, as they imagined that his great Practice otherwise would induce him to lay such a troublesome office down, and that some young Practitioner would undertake it on more moderate terms." Whereupon Dr. Garden made place for Doctor Pillans at £220 a year, but this physician was "complained of to have given very insufficient attendance" and was discharged in less than a twelvemonth, to be succeeded by another unsatisfactory incumbent, Dr. Cholmondeley Dering.[13] His successor, Dr. Lawrence Meyer, retired to the country in 1765, and Dr. Delahow filled his place.

Crowded conditions in the Workhouse and Hospital now led the Vestry to obtain permission from the Governor to use the unoccupied New Barracks for the temporary accommodation of the poor, and shortly thereafter to address a Memorial to the Assembly, stating in regard to the Workhouse that as

> . . . Seaman & Slaves are to be committed to the said house, and there is constantly in it a great number of these, it is Impossible that the poor, who are become very numerous can be accomodated there. That even Supposing there was room for the reception of the poor; your Memorialists submit it to the Consideration of Your Honours if it would not be an Act of Inhumanity to put the poor and sick (who may be and often are pious and well disposed persons) in a place where there is dayly correcting of slave, a Continual Noise and Disturbance, Cursing and Swearing from the Seaman & others confined there . . .

and asking relief. Furthermore, the vestry met at the Workhouse and ordered out a number of the inmates, several "for Selling rum & disorderly living." The institution was hardly the place for an invalid. Indeed probably all such institutions of the time were of the same generally unsatisfactory character, for Garrison[14] remarks that "hospitals remained notorious for uncleanliness and general danger to life well into the nineteenth century." However, it may be recalled that the present Bellevue Hospital in New York is the outgrowth of a single large room for patients in the Public Workhouse of that city,[15] and hence the situation in Charlestown was not unique.

Doubtless the inmates of St. Philip's Hospital (almost all of them chronic invalids, it appears) received no better than the usual treatment. We may picture the fashionable physician of the day, gorgeous in his red brocaded coat, sniffing at the aromatic drugs in his gold-headed cane, and dumbfounding his trailing apprentice with comments on the latest medical theories as he moved about the noisy building. The surgeon, but recently divorced from the barber, still occupied a humble position, and as far as the records show, did not carry on any remarkable surgical work in the hospital. Men-midwives were as yet of dubious popularity.

Of the type of medical treatment accorded the patients there is no record. Supposing however, one of these parish physicians had called the well-known Dr. Lionel Chalmers into consultation on a case of tetanus, the management would probably have been as follows: The patient was made to avoid heating or stimulating things; if plethoric, he was bled. He was given opiates, warm baths, and laxatives such as manna or treacle water. He was fed through the spout of a teapot, and glysters of a decoction of camomile flowers with oil were administered. "A bladder half-filled with warm water, and tied close" was kept constantly on the pit of the stomach. If the victim happened to be a newborn infant with nine day fits, the doctor would have attributed the condition to the fact that the child had "been preposterously fed before the guts" had been cleared from the meconium.[16]

The cost of maintenance of a pauper in the Workhouse was noted as 3 shillings and 6 pence daily (1773). Of the fare no note is made except the curious order (1777) "that dinner be provided every day and served up at the Work House at Twelve o'clock . . . & that any Rum that may be wanted be supplyed by the Church Warden." Early in its existence, the Warden of the Workhouse had been required to render a "weekly account of all Such Persons which shall be taken in and victualled . . . and what number of Persons shall die or be discharged." Infants were probably not kept long in the hospital, but were boarded out for wet nursing. Artificial feeding at that time was deadly.

In 1763 a number of private hospitals[17] for purposes of inoculation were opened. With these the Church authorities had nothing to do, and there is no indication that the Vestry sponsored inoculation or that the hospital was used for that purpose. Perhaps one reason for this inactivity was the overcrowded or dilapidated condition of the building, for shortly thereafter (1768) the state of the structure was such that an act[8] was passed providing for a new building of brick, with a brick wall, to be put on the "four acres of ground belonging to the public." Several years before the Grand jury had cited the need of a "general hospital or poor house,"[18] but no action had been taken.

In 1767 Dr. James Clitherall[19] became physician at a salary of £410 currency, and probably attended (1768) among other patients, the negro school teacher Harry, who was sent to the workhouse and "put into the Madhouse, there to be kept," and to suffer the current mistreatment of the insane. His salary was increased in 1769 to £500. Next year, with his partner Dr. Farquharson,[20] he asked for an increase and obtained £600. In 1772 the Vestry rejected the application of these two physicians and appointed Dr. Tucker Harris in their place. Three years later his salary rose to £700, and in another three years to £1000. Afterward he entered the service of the Continental army, and Dr. George Logan assumed his interrupted duties. War prices forced Dr. Logan to threaten resignation, but an increase in salary of £1000 and arrangement for obtaining medicines at lower prices from the General Hospital satisfied him. At this time the budget for the poor amounted to £120,000 Continental currency. After the Revolution Dr. Logan was still in office at a salary of £100 Sterling (1783).

In 1789 a letter to the Vestry from the new City Council indicates that the care of the poor had passed from the hands of the church into the hands of the civil authorities, and no further mention of Hospital or Parish Doctor appears in the minutes. Under the new government changes were probably made in the previous arrangements, and the indigent sick of the city became subject to the presumed benevolence of a democratic administration.

References

1. Trott, Nicholas. The Laws of the Province of South Carolina. Charlestown, Lewis Timothy, 1736, 1: 270.
2. Account Book of St. Philip's Vestry 1725 through 1751. Manuscript in possession of the vestry of St. Philip's Church, Charleston, S. C.
3. Sainsbury Transcriptions (Great Britain, Public Records Office, Public Records of South Carolina). vi, 270. The cost of erection of the pest house is included in the account of expenses for the years 1701–1716.
4. *South Carolina Gazette*, Mar. 11, 1731, also Mar. 18, 1732. Files of the Charleston Library Society, Charleston, S. C.
5. Hirsch, A. H. The Huguenots of Colonial South Carolina. Durham, N. C., 1928, pp. 320, 321.
6. Minute Book of St. Philip's Vestry 1732 to date, with occasional gaps. Manuscript in possession of the Vestry of St. Philip's Church, Charleston, S. C. Most of the data of this paper are obtained from these minutes.
7. An Act for the Better Relief and Employment of the Poor of the Parish of St. Philips, Charlestown. Trott, N. The Laws of the Province of South Carolina, 2: 32.
8. An Act appropriating the present Work House for a place of Correction: for building a Poor House and Hospital . . . etc. McCord, D. J. Statutes at Large of South Carolina. Columbia, 1840, 7: 90.
9. *S. C. Gazette*, Aug. 3, 1738.
10. "Dr. Frederick Holzendorff Chirurgeon of St. Philips Hospital in Charleston" moved from King St. to the Bay. *S. C. Gaz.*, Feb. 29, 1748. Died at Dorchester. *S. C. Gaz.*, Jan. 29, 1754.
11. Oliphant and Mackie were proprietors. *S. C. Gaz.*, 1747. Likewise Samuel Carne opened a similar institution. *S. C. Gaz.*, 1747.

12. Statutes at Large of So. Car. Vol. III, 720 No. 771, June 1, 1749.
13. Indicted by the grand jury for scandalous behavior. *S. C. Gaz.*, Oct. 31, 1765.
14. Garrison, F. H. History of Medicine Ed. 4, Phila., 1929. P. 400.
15. *Ibid.*, p. 406.
16. Chalmers, Lionel. Of the Opisthotonos and Tetanus. Medical observations and Inquiries, Vol. 1. Ed. 2, Lond., 1758.
17. Samuel Carne and Robert Wilson, Surgeons and Apothecaries operated one of these (*S. C. Gaz.*, May 28, 1763). Dr. John Swint, next door to the sign of the Black Bull in King St. opened another, and insured at 5 per cent (*S. C. Gaz.*, June 4, 1763). Elizabeth Girardeau, next door to the Orange Garden, took in persons at 10 pounds per week (*S. C. Gaz.*, June 11, 1763). Another hospital for slaves was opened at Mr. Chisolm's plantation in Christ Church Parish (*S. C. Gaz.*, May 28, 1763), another on Foster's Creek in the parish of St. James, Goose Creek, with accommodation for slaves at 15 pounds per head and a few white persons at 30 shillings a day (*S. C. Gaz.*, May, 1763). Dr. William Loocock, on Broad St. opposite to Union St. provided nurses, medicines and every necessary for town and country negroes and insured at 5 per cent (*S. C. Gaz.*, Mar. 26, 1762).
18. *S. C. Gaz.*, June, 1765.
19. Dr. Clitherall at one time owned the "Stuart house" at the corner of Tradd and Orange Streets. He was a Loyalist during the Revolution. He is mentioned as late as 1790.
20. Dr. Farquharson was a friend of the Manigault family and a practitioner of reputation. He was deported as a Loyalist during the Revolution. *S. C. Gaz.*, July 15, 1778.

DR. LYDIA FOLGER FOWLER

THE SECOND WOMAN TO RECEIVE THE DEGREE OF DOCTOR OF MEDICINE IN THE UNITED STATES

By FREDERICK C. WAITE, Ph.D.

CLEVELAND, OHIO

IT is well known that the first degree of doctor of medicine conferred upon a woman in the United States was that received by Dr. Elizabeth Blackwell on January 23, 1849, from the Geneva Medical Institution, affiliated with Hobart College, at Geneva, N. Y. That school accepted no other women as students and gave no other degrees to women until it closed in 1872, with the single exception of one degree conferred in 1865. Therefore, the graduation of Miss Blackwell may be considered as an episode in medical education, rather than as the establishment of a policy of coeducation in medicine.

The identity of the second woman to receive the medical degree is not commonly known. That distinction usually has been given to Miss Sarah Read Adamson of Philadelphia, who, as Dr. Sarah R. A. Dolley (1829–1909), practiced medicine in Rochester, N. Y., for more than forty years.

In the summer of 1849 two factions of eclectic physicians in central New York state united in the organization of the Central Medical College to be located at Syracuse, N. Y. At the same time this group established a journal under the name of the *Eclectic Journal of Medicine and Surgery*. In July, 1851, this name was shortened to the *Eclectic Journal of Medicine*.

The faculty was formed under the deanship of Dr. Stephen Hollister Potter (1811–1883). He had received his degree of doctor of medicine in 1838 from the Worthington Medical College, a reformed botanic school located at Worthington, Ohio, from 1830 to 1838.

Three weeks before the opening of instruction at Central Medical College, the "faculty and proprietors" decided to admit women as students on the same conditions and with the same privileges as men.[1]

The first session "opened November 5, 1849, with four women in attendance."[2] Dr. Potter, writing five years later, names five women as in attendance at the beginning of the first session. These names include those of Mrs. L. N. Fowler and Mrs. R. B. Gleason.[3] *The Northern Christian Advocate* of February 13, 1850, in an editorial regarding this school, says that "seven ladies attended in the past session." Whatever the exact number, the Central Medical College was the first medical school to adopt a policy of coeducation and to receive a group of women students. This is the most significant fact, historically, in its short existence.

Before the first month of the session had passed factional dissension developed in the faculty. The points at issue were financial in part, but also concerned dissecting material incidents, a matter which has hampered many a school's progress. In January, 1850, it was decided to move the college to Rochester, the headquarters of one faction, at the end of the current session. The session closed on February 21, 1850, when the degree of doctor of medicine was conferred on seventeen persons.[4] The newspaper notice does not give the names of these graduates, nor does it mention the graduation of a woman, which would have been of enough novelty to merit special comment.

At Rochester, in March 1850, the faculty was reorganized under the deanship of Dr. William Warriner Hadley, a graduate in 1849 of the Eclectic Medical Institute of Cincinnati. Dr. Potter and his partisans were not included in the new faculty. Ten months later, in January 1851, they established the rival Syracuse Medical College and a rival journal.

The second session of the Central Medical College opened at Rochester, N. Y., on the first Monday in March 1850, and closed June 5, 1850. *The Rochester Daily Advertiser* of the previous day in a short item notes that the commencement is to occur but gives no list of graduates. *The Eclectic Medical and Surgical Journal* for July, 1850[5] states that the commencement was held on June 5, 1850.

In the same journal for June[6] is given a list of the ninety-two "Matriculates for 1849–50," of whom eighty-six were residents of New York State. Among these matriculates are listed eight women, including Miss S. R. Adamson, Mrs. L. N. Fowler, and Mrs. R. B. Gleason. There also appears a list of twenty-one "Graduates of 1849–50" in which list, as the only woman, appears the name of Mrs. L. N. Fowler. This list does not indicate which individuals graduated on February 21st and which ones on June 5th. As already stated, seventeen graduated on February 21st, leaving four who graduated June 5th.

In the same number of this journal (p. 372) is an announcement of the teaching staff for the next session, which includes "Mrs. L. N. Fowler, M.D., Principal of the Female Department, Mrs. R. B. Gleason, Assistant." There are no initials of M.D. after Mrs. Gleason's name. In the advertisement of the Central Medical College in the Northern Christian Advocate of September 4, 1850, appears the name "Mrs. L. N. Fowler, M.D., Principal of the Female Department."

Under its new name the *Eclectic Journal of Medicine* of August, 1851,[7] gives a list of "Matriculants of Winter Session 1850–51 of Central Medical College." There are listed ten women, including Mrs. L. N. Fowler, M.D. and also Miss S. R. Adamson and Mrs. R. B. Gleason with no M.D. after their names. At the end of the list under "Graduates" appear twelve names divided under "Gentlemen" and "Ladies." Under the latter heading appear two names, Miss Sarah R. Adamson and Mrs. Rachel B. Gleason. The commencement was on February 20, 1851.[8] In the same journal for March is an article by "Mrs. R. B. Gleason, M.D." Moreover, the diploma of Dr. Gleason, now in possession of one of her descendants, bears date of February 20, 1851. In the same journal for September, 1851[9] reference is made to "Miss S. R. Adamson who took her diploma at Central Medical College at the close of last winter's session."

These citations establish that Dr. Adamson and Dr. Gleason graduated on February 20, 1851, but that Dr. Fowler graduated before the end of June 1850.

The next question is whether Dr. Fowler was graduated on February 21, 1850, at Syracuse or on June 5, 1850, at Rochester. On its establishment the Central Medical College announced that it would require of each candidate attendance on at least two courses of lectures before graduation. This statement was repeated in subsequent years. There is no reason to believe the rule was violated. The graduation of seventeen at the end of its first session is explicable if these had attended a course of lectures at some other medical college previous to September 1849. Several of the graduates in the first year have names, initials, and residences identical with those found in the student lists of other medical colleges in years before 1849.

It is repeatedly stated, regarding Central Medical College in 1849–50, both in newspapers and in medical journals, that this medical school is the first medical school to accept women students, with the exception of the Geneva Medical Institution in the single instance of Elizabeth Blackwell. A search of announcements and student lists of other chartered medical schools up to 1850, including regular, homeopathic, eclectic, and botanic institutions, fails to discover any privilege extended to women or any woman enrolled as a medical student. The Female Medical College of Philadelphia did not open until October 12, 1850. It therefore appears that it would have been impossible for Mrs. L. N. Fowler to have attended a course of lectures in any chartered medical college previous to her entrance at Central Medical College in November 1849. If she fulfilled the requirement of attendance on two courses, she must have attended both of these at that school and therefore could not have graduated before the end of the second session on June 5, 1850. Moreover, her husband states that she "succeeded in getting her degree at Rochester." Since she held a degree before the end of June 1850, it seems highly probable that June 5, 1850 is the correct date of her graduation.

The possibility has not been overlooked that she may have attended the unchartered Boston Female Medical College, which gave one course of lectures ending in January 1849, and another ending in June 1849. This was not a medical college in fact until 1852, and had no charter until 1850. It was a training school for midwives with a single instructor in its early years. However, collateral evidence makes it improbable that Mrs. Fowler attended either of the courses in 1848–9, for during part of the time each of these courses were in progress in Boston, newspaper notices show that Mrs. Fowler was lecturing in various towns in central and western New York.

The foregoing citations from rare files of contemporary publications establish that Mrs. L. N. Fowler graduated in 1850, probably on June 5th, and that Miss Sarah Read Adamson and Mrs. Rachel Brooks Gleason graduated on February 20, 1851. Therefore, Dr. Fowler was the second woman to graduate in medicine and Drs. Adamson and Gleason the third and fourth women to receive the degree of doctor of medicine.

The fifth woman to receive the degree was Mrs. Margaretta B. Gleason, the wife of a Philadelphia physician. She received the degree at the close of the first session of the Syracuse Medical College on March 6, 1851. It is probable that another woman graduated at the end of the first session of this school, during which six women were in attendance, but there is a conflict of records as to her name.

The next group of women to receive the degree of doctor of medicine were the eight women graduated at the close of the second session of the Female College of Philadelphia on December 31, 1851. Therefore, before January 1, 1852, thirteen or fourteen women had received the M.D. degree, one (Dr. Blackwell) in 1849, one (Dr. Fowler) in 1850, and eleven or twelve in 1851.

At the Central Medical College no spring session was given in 1851. At the close of the winter session on February 18, 1852, three women were graduated, namely, Miss Parmelia A. Bronson, Mrs. Lettice N. Doud, and Mrs. Mary A. Sawyer. At the end of the spring session on May 27, 1852, one woman, Mrs. Myra King Merrick, was graduated. In 1852 at least three medical schools, other than those mentioned, graduated women in medicine. In October, 1852, the Central Medical College finally closed and merged with its rival, the Syracuse Medical College, which graduated women from March, 1851, until it closed in February, 1855.

In addition to the distinction of being the second woman to receive the degree of doctor of medicine, the career of Dr. Fowler has many points of interest.

Lydia Folger was born in Nantucket, Massachusetts, on May 5, 1822, the daughter of Gideon and Eunice (Macy) Folger.[10] She was a descendant in the sixth generation of Peter Folger (1618–1690), descended from the Earl of Shrewsbury, who came from Norwich, England, in 1635, and settled in Nantucket in 1663. Benjamin Franklin, through his mother Abiah Folger, was his great-grandson. Contemporary in Nantucket with Lydia Folger, and also a descendent from Peter Folger along a collateral line in the sixth generation, was Maria Mitchell (1818–1889), distinguished woman astronomer and Professor of Astronomy in Vassar College from 1861 to 1884.

Lydia Folger was "an ardent student" and received "a training somewhat more comprehensive than was customary for young ladies in her day." She became especially interested in mathematics and astronomy through the father of Maria Mitchell, who was a teacher in Nantucket. In this interest she was encouraged by her uncle, Walter Folger (1765–1849), who was an astronomer and an inventor of astronomical instruments, including an astronomical clock.

On September 19, 1844, Lydia Folger was married at Nantucket to Lorenzo Niles Fowler (1811–1896) a "practical phrenologist."[11]

In 1832 Johann Spurzheim delivered in Boston a series of lectures on phrenology, which had been founded by Francis Joseph Gall in 1796. This subject aroused considerable interest which extended to New England colleges. In the literary societies of Amherst College debates on the subject were carried on and one of the leaders was Henry Ward Beecher. His classmate was Orson Squire Fowler (1809–1887) who, with his brother Lorenzo, was at Amherst preparing for the ministry. Through Mr. Beecher the Fowler brothers became interested in phrenology and when, in 1834, the elder Fowler graduated at Amherst College, the two brothers concluded to spend some time in itinerant lecturing on phrenology to give them practice in public speaking as a part of their preparation for the ministry.

The Fowler brothers never continued their further preparation for the ministry. During the next twenty-five years their names came to be almost synonymous with phrenology. In 1835 they opened in New York City an office for arranging lectures. In 1842 they founded a publishing business and took over the editing and publishing of the *American Phrenological Journal*, founded in 1838 in Philadelphia. In 1844, with Mr. S. R. Wells, they established the publishing house of Fowler and Wells, which published books and journals chiefly in connection with phrenology and hydropathy, which was also a popular novelty at that time.

Lorenzo Fowler divided his time between office work and lecture tours throughout the United States and Canada. His lectures included temperance as well as phrenology. In connection with the latter he made public and private examinations, filled out individual phrenological charts and, based on these, made predictions as to the capabilities and future careers of the individual examined. Since parents wished to know for what career their children were best fitted, these individual predictions, at ten dollars each, developed into a very lucrative business in every town in which he lectured.

As early as 1845 Mrs. Fowler accompanied her husband on these lecture tours. Mr. Fowler gave his lectures in each town as a series of six to ten lectures in the evenings in some public hall. As early as 1847 Mrs. Fowler began giving afternoon lectures to women on anatomy, physiology and hygiene. Her ability and popularity as a lecturer is shown by numerous comments in the newspapers of the towns in which she lectured.

In 1847 she published two books entitled "Familiar Lessons on Physiology" and "Familiar Lessons on Phrenology."[12] In 1848, she published "Familiar Lessons in Astronomy."[13] All three of these books had as a sub-title, "Designed for Use of Children and Youth in Schools and Families." These books, elementary in content, are written in a direct, simple style. Each of these books had a good sale and second editions appeared within two years.

Therefore when Mrs. Fowler entered the Central Medical College in November, 1849, at the age of twenty-seven years, she was already favorably known both as a lecturer and as an author.

On the reorganization of the faculty of the Central Medical College at Rochester in March 1850, there was established a "Female Department" and Mrs. Fowler was made principal of it. For the year (1850–51) following her graduation she had the additional duty of "demonstrator of anatomy to the female students." In the summer of 1851 she gave an address on obstetrics at the meeting of the New York State Eclectic Medical Society. This was very favorably received and the society passed a vote requesting the publication of the address in full.

For the year 1851–52 she served not only as principal of the female department of the Central Medical College but also as Professor of Midwifery and Diseases of Women and Children.[14] Dr. Fowler thus became the first woman in America to hold a professorship in a medical college. This distinction has usually been given to Dr. Ann Preston at the Female Medical College of Philadelphia, but Dr. Preston did not receive her medical degree until December 31, 1851, two months after Dr. Fowler began her duties under her professorial title.

Dr. Fowler served as professor for one session only, that of 1851–52, since in October, 1852 the Central Medical College was dissolved and merged with its rival and Dr. Fowler did not join the combined faculty.

Somewhere "about this time she published her first tale; it was entitled, Nora, the Lost and Redeemed, and was brought out as a serial in a Milwaukee paper. Subsequently this story was published in England." Attempts to identify the paper and ascertain the date of this serial have failed. The book was published in London in 1863.[15] It was a "new temperance tale and embraces the social, physiological and philosophical phases of temperance." Into it is woven an argument for women entering the practice of medicine, with indications that it was written after the author's graduation from medical school, although this argument may not have been in the original when published as a serial.

In 1852 Dr. Lydia Fowler began the practice of medicine in New York City, which she continued until 1863. During part of those years she was also engaged in teaching.

In 1854[16] Dr. Lydia F. Fowler advertises "a course of private medical lectures to females" to continue eight weeks with a fee of fourteen dollars. These were given in the rooms of the Metropolitan Medical College at 63 East Broadway, but not during its regular term. This was a physiopathic (physio-medical) school that continued from 1852 to 1862. Similar lectures were given in New York City by Dr. Lydia Fowler in other years than 1854. She also gave "lessons to women in gymnastics."

In 1854 are found three articles by her in medical journals. These were under the titles, "Medical Progression,"[17] "Female Medical Education,"[18] "Suggestions to Female Medical Students."[19] This journal was published by the Metropolitan Medical College. No evidence has been found to show that Dr. Lydia Fowler was on the teaching staff of this school, but the fact that she gave her private courses in its "lecture hall" and wrote for its journal shows close relations to the school.

In 1862 she was an instructor in clinical midwifery in the New York Hygeio-Therapeutic College, a hydropathic school conducted by Russell T. Trall from 1857 to 1864.

In 1860 Messrs. Lorenzo Fowler and S. R. Wells went on a lecture tour in Great Britain. Dr. Lydia Fowler accompanied them and continued her "addresses to ladies on the laws of life and health."

After a trip to Italy she spent the winter of 1860–61 in medical study in Paris. Next she became an attendant in a London hospital. For three months she had charge of the obstetrical department of this hospital, which the record does not identify by name. After this period of medical study she returned to her practice in New York City.

In 1863 the Fowler brothers withdrew from the publishing house of Fowler and Wells, and Lorenzo Fowler and his wife, Dr. Lydia Folger Fowler, took up their permanent residence in London, where they remained until her death. Neither the British Medical Register nor the list of the Society of Apothecaries of London, where some women were listed, show her name as having been entered as a registered medical practitioner. Her efforts were given to lecturing to women on physiology, hygiene and diseases of women and children rather than to medical practice. In this work "she visited every large town in Great Britain and Ireland, lecturing on the laws of life, physical culture, moral duty and social reform." Shortly before her death she estimated that she had lectured to two hundred thousand women in America and Europe, over a period of more than thirty years.

In 1863, she published "The Heart and Its Influences,"[20] and also "Nora, the Lost and Redeemed" in book form. In the same year she published in a series of twelve pamphlets some of her lectures. In 1865, part of these were assembled and revised and published under the title, "The Pet of the Household and How to Save It."[21] This book covered not only the diseases of children but also the rearing of children, with emphasis on mental and physical development. About this time she published "Woman and Her Destiny."

From 1865 to 1875 Dr. Fowler traveled widely on the Continent and visited Turkey, Egypt and Palestine.

In 1870, she published a book of poems under the title of "Heart Melodies."[22] These poems were written intermittently from her early womanhood. Just before her death she had completed the manuscript of a temperance novel.

Her literary contribution was greater than is evidenced by the publications under her own name, for she was the intimate assistant of her husband in his editorial and literary work. Some of the works published under his name show in places her style of writing, which was direct and simple compared to the involved and pompous style of Mr. Fowler.

Dr. Fowler was active in temperance work in Great Britain and her service was recognized by her election as honorary secretary of the Woman's British Temperance Society. She was also active in social service, being a stated district visitor for one of the London Congregational churches (The City Temple on High Holborn) at the time of her death.

Dr. Lydia Folger Fowler died of pleuropneumonia on January 26, 1879, at her residence, 62 St. Augustine's Road, Camden Square, London, at the age of fifty-six years, being actively at work in many lines of endeavor until a few days before her death.

In consideration of American women physicians, Dr. Lydia Folger Fowler has been entirely missed by all writers. This is due to the fact that, leaving the United States in 1863, the greater part of her active life was spent in London.

Although she was connected with sectarian medicine and with the vagaries of phrenology, physiopathy, and hydropathy, and while she gave only eleven years to medical practice, yet she deserves record in American medical history. In her attention to phrenology she had the company of many well-known physicians and clergymen of the middle nineteenth century.

Her connection with irregular medical schools was a corollary of the fact that few of the regular schools would admit women as students.

She was the second woman to receive the medical degree in the United States. She was the first woman in America to attain to a professorship in a medical college and one of the few to continue her medical studies in Europe. She wrote and published several worthwhile articles and books. However, her major service was through her popular lectures to women on medical subjects. With a commanding presence, charm of manner, excellent command of English and with the background of medical study and practice, she was able to instruct and influence a large number of women. With her writing and lecturing she came in personal contact with more individuals than did any other woman physician of her time and probably had a much wider beneficial medical influence than she would have had if she had devoted herself entirely to medical practice.

Her ability, industry and personal charm won for her wide recognition in England. Good inheritance, innate intellectual capability, abundant industry, and somewhat unusual opportunity combined to make a career that measures up to the best traditions of American medical women.

REFERENCES

1. *Syracuse Daily Star*, Oct. 23, 1849; *Northern Christian Advocate*, Auburn, N. Y., Oct. 24, 1849, p. 118.
2. *Literary Union of Syracuse, N. Y.*, Vol. 2, p. 89, Nov. 10, 1849.
3. *American M. & S. J.*, 7: 152, April, 1855.
4. *Syracuse Daily Standard*, Feb. 22, 1850.
5. Vol. 2, p. 30, 1850.
6. Vol. 1, pp. 379–382, 1850.
7. Vol. 3, pp. 61–62, 1851.
8. *Electric J. Med.*, 2: 307, April, 1851.
9. Vol. 3, p. 94, 1851.
10. *Nantucket Vital Statistics*, Vol. 1, p. 490.
11. *Nantucket Vital Statistics*, Vol. III, p. 479.
12. 12mo, 209 pp., 55 illus.
13. 12mo, 165 pp., 44 illus.
14. *Northern Christian Advocate*, Oct. 22, 1851, p. 119.
15. 12mo, 219 pp.
16. *American Phrenol. J.*, 19: 47, Feb., 1854.
17. *Syracuse M. & S. J.*, 6: 200–202, 1854.
18. *J. Med. Reform*, 1: 43–45, 1854.
19. *Ibid.*, 1: 127–130, 1854.
20. 12mo, 30 pp., London.
21. London, 12mo.
22. London, 12mo.

THE PHARMACOLOGY OF THE ANCIENT MEXICANS[*]

By DAVID CERNA, M.D., PH.D.

SAN ANTONIO, TEXAS

THE Egyptians appear to have been the first people to make a study of botany, and particularly of the medicinal virtues of plants. For many centuries the practice of the healing art among them was confined to the empirical use of remedies of vegetable origin in the treatment of those ailments that did not require surgical intervention.

The Greeks adopted the same system. In his great poem, the "Aeneid," Virgil refers to this method, a method which afterwards was handed down to the Romans and others of our later ancestors.

Similarly, as has been the case with most primitive peoples, the ancient inhabitants of Anáhuac based their therapeutics, that is, their medical treatment of disease, principally on their knowledge, empirical and scientific, of medicinal plants of which they also made a special study.

We have learned a good deal about the pharmacology of these early and highly cultured Mexicans, through the writings of various reliable historians, and particularly through those of the celebrated Hernández sent especially by the Crown of Spain to study the flora and fauna of Anáhuac. In his great work on "Natural History" Hernández speaks extensively of the pathology and the materia medica as developed by those extremely interesting inhabitants of the New World.

In describing the wonderful basis upon which the Mexicans built their knowledge of botany, especially of medicinal plants, Hernández refers also to their therapeutics, bringing out the fact that the largest number of the remedies employed by those people was of vegetable origin.

The Aztecs, indeed, were great horticulturists and devoted much of their time to the study of plants, preferably of those that seemed to possess medicinal virtues.

As far as we have been able to learn, the last king of Pergamus, Attalus III, or Philometer as he was also called, who lived about 130 years before Christ, insisted that in the royal gardens, in preference to other plants, those having medicinal virtues should be extensively and carefully cultivated.

The same thing was done in the New World many centuries after, similarly through kingly influence, in the magnificent gardens of the Aztec monarch, Montezuma II; but with a difference worthy of notice: Attalus would use the poisons obtained from certain plants, to do away with his political enemies, a practice followed so extensively by later rulers. Montezuma, on the contrary, ordered the best medicinal plants discovered and cultivated in the royal gardens, to be distributed among his subjects gratuitously, that they might employ them in the treatment of their ills with the advice of the physicians furnished by the government.

On the other hand, accustomed as they were to eat those herbs that had a pleasant taste, the Mexicans at large, outside the royal gardens, became acquainted with medicinal plants with which they enriched their pharmacology, this being at first, as has been intimated, of a purely vegetable character.

---

[*] Read before the Scientific Society of San Antonio, Texas, January 6th, 1922.

Later, however, the Mexican healers and the regular physicians widened their knowledge in the treatment of disease by studying and employing remedies of mineral and animal origin also.

Among the former, the Aztecs used common lime (*tenexte* or *tenextli*) in the treatment of certain gastrointestinal disorders, especially enterocolitis, the use of which mineral still persists, and for the same purpose.

A substance somewhat resembling Liquidambar, called by the ancient Mexicans *cozticpecpatl*, was used in heart troubles. Sulphur (*tlequiquiztlali*), alum (*tecècec*) and common salt (*yztlatl*) were similarly employed in various affections.

In the form of realgar or red sulphide of arsenic (*micuanpatli*), and in that of the yellow oxide of arsenic (*teteyetli*), that mineral drug was used extensively by the ancient Mexicans in the treatment of skin diseases, just as we now employ it in exactly the same affections. This practice has hardly suffered any change in modern times.

It is justifiably believed that a large number of cutaneous eruptions are due to syphilitic infection; and no better remedy, with the exception of mercury, perhaps, has been offered to combat such eruptions than arsenic. Arsenic, therefore (it may be said in passing), cannot be looked upon as a new remedy in the treatment of syphilis, as has been claimed, even if that drug appear in the commercial form of 606 or salvarsan, or with the scientific name of *dioxydiamidoarsenobenzol* or *diaminodihydroxyarsenobenzene hydrochloride*, or, more simply, *arsphenamine*. As in many other instances, we can here exclaim: *Nihil sub sole novum*: there is nothing new under the sun.

Remedies obtained from the animal kingdom are also as old as the practice of medicine, and among all peoples.

Pliny severely arraigned the Greeks for using the human flesh in the treatment of certain diseases. In Rome, Musa was the first to use the meat of snakes for similar purposes.

During the 13th century, Gilbert, of England, employed the meat of the lion against apoplexy with alleged good results.

Some of the Mexican tribes used the warm blood of the deer in epilepsy, and later that of other animals for the same purpose, a custom that still prevails among the natives.

In the treatment of other ailments, the ancient Mexicans employed largely the following substances: tiger's meat against nervous troubles, and the excrement of the same animal to combat insanity particularly; the meat of the *tlepatli*, the iguana, and that of other species of the lizard family; that of *quatapalcatl*, the chameleon, and others.

The Mexicans attributed medicinal virtues to several species of the black beetle, and some of these remedies are still in use in the therapeutics of today.

For instance, we moderns have retained as therapeutic agents of some value the cockroach and the Spanish fly, in diverse forms, in the treatment of certain disorders. The Spanish fly, by the way, is not a fly but a beetle, and is known technically as cantharides, or, better still, as *Cantharis vesicatoria*. The cockroach or *Blatta orientalis* is still employed, particularly in Russia, in the treatment of dropsical diseases.

Nowadays some of us are likely to be considered fossil practitioners if we fail to employ the endocrine products so named, for which unusual claims are made as curative remedies, despite the fact that we are yet largely ignorant of the physiology and pathology of the various ductless glands from which such products are obtained. But what about the substances contained in certain glands of the musk-deer, *Moschus moschiferus*, and in the preputial follicles of the common beaver, *Castor fiber*, substances which we have for a long time been using as good antispasmodics?

Be all this as it may, the primitive Mexicans, as is the case with most peoples and at all epochs of civilization, obtained the large majority of their remedies from the vegetable kingdom.

We know that in Anáhuac all classes of people, men, women and children, educated and non-educated, became intimately acquainted with many remedial herbs which they gathered at certain times of the year, in the fields at large or in the cultivated gardens, and in various crude or pharmaceutical forms employed them in the treatment of disease.

Betancourt and Sahagun refer in their works to how they were taught the properties, true or imaginary, of many plants, specimens of which were carefully preserved in the herbariums established by the natives of Tlaltelolco. A large number of these medicinal plants are at present in use by the modern Mexicans. The knowledge about many of these plants was transmitted to the Europeans by Hernández.

Among those vegetable remedies, of real therapeutic value, that the Mexicans taught the Europeans, and which have come down to us, may be mentioned the following: sarsaparilla, jalap, the castor oil plant, stramonium, cassia fistula, the cacao bean from which theobromine is obtained, Indian hemp, the various species of capsicum, chenopodium, tobacco, a species of poppy, and others. Some of them have been discarded or forgotten, as, for instance, the oil extracted from the rubber tree, a plant technically known to us as the *Castilla elastica*, and which oil was employed in the treatment of bronchial affections and against hemorrhages.

In their pharmacotherapy the Mexicans used not only the simple plants themselves in diverse forms, but also official preparations, combinations or formulas made up of various ingredients, since they had formed their own pharmacopeias.

In their therapeutic classifications were included some original groups of vegetable drugs exhibiting similar properties, just precisely as is done at present. And so they had their astringents, purgatives, laxatives and drastics, emetics, diuretics, diaphoretics, antipyretics, tonics, expectorants, emollients, emmenagogues, narcotics, hemostatics, alteratives, anthelmintics, and others.

To some remedies, singly or in combination, the Mexicans attributed imaginary virtues to conform with the superstitions and commercialism of the times. Some of the remedial agents were administered, accompanied with supplications to this or that divinity, so that the effect desired might be produced; and likewise in the prevention of disease, especially during their theosophic ceremonies or religious rites. Often they relied solely on the efficacy of prayer.

So, then, we observe that quackery and superstition, in this regard, were as common among the ancient Mexicans as among other peoples at all times and at all grades of civilization.

Mesmerism, hypnotism and suggestion (all three may be included in the single word psychotherapy), homeopathy, osteopathy, chiropractic, Christian Science, and other superstitious therapeutic cults are being practiced today in spite of the alleged progress of scientific medicine.

Are we moderns, then, better prepared than our ancestors to prevent or combat disease by employing what we call rational scientific methods? For even the latter are not entirely devoid of a certain amount of charlatanism and commercialism.

The Nahoas, it is true, employed what we now consider as erroneous methods of treatment; but they did so in conformity with the predominant astrological theories of the times.

The Mexicans of old looked upon the organs of the body and some of its parts in such a way as to have them represent either the twenty signs or figures used by them in their mathematical system, or the twenty days of which their month was composed or, again, twenty of the then known heavenly planets. The latter two suppositions are the most commonly accepted; for we find, for instance, that, according to Humboldt, these signs constituted their zodiac. And both, the German scientist, and Chavero, the Mexican historian and archeologist and one of the greatest authorities on ancient Mexican hieroglyphics, believed that these signs had an astronomical significance.

To obtain a better idea about this phase of the peculiar therapeutic system of the ancient Mexicans, I will have to refer briefly to their chronology and their astronomy, as I have had occasion to do before.

The Nahoas divided the time into periods or ages, each one of which was made up of two centuries; each century was composed of fifty-two years; each year of eighteen lunar months; each month of twenty days, or four weeks, and each one of the latter of five days. The day was divided into a certain number of periods of equal length, corresponding to our hours, and were determined by the course or movements of the sun and other heavenly bodies.

The twenty days of each month were related to twenty planets, and each one of these was made to represent an organ or part of the human body, as follows:

Cipactli, the sun, was related to the liver; *Ehecatl*, the wind, to the lungs, or the respiration; *Calli*, the house, to the right eye; *Cuetzpalin*, the lizard, to the buttocks; *Coatl*, the serpent or snake, to the reproductive organs; *Miquiztli*, grim death, to the head; *Mazatl*, the deer, to the right leg; *Tochtli*, the rabbit, to the left ear; *Atl*, the water, to the hair; *Itzquintli*, the common dog, to the nose; *Ozomatli*, the monkey, to the left arm; *Malinalli*, an herb (classification unknown), to the intestines; *Acatl*, the arrow, to the stomach; *Ocelotl*, the tiger, to the left leg; *Cuauhtli*, the eagle, to the right arm, *Cozcacuauhtli*, the vulture, to the right ear; *Ollintonatiuh*, the earthquake, or the four movements of the sun, to the tongue; *Tecpatl*, the arrow-head, to the teeth; *Quiahuitl*, the rain, to the left eye; and *Xochitl*, the flower, to the breasts.

As may be observed, we have here the zodiac of the ancient Mexicans, some of which signs (five of them) were, singularly enough, exactly the same as those of the Chinese zodiac, to wit: the rabbit, the monkey, the dog, the serpent and the tiger; and two of them, that is, the lizard and the eagle of the Mexicans, correspond to the crocodile and the hen of the Chinese. Can this be a mere coincidence, or could it be considered as an evidence that there was some sort of intercommunication of these two peoples in prehistoric times?

Be this as it may, the inhabitants of Anáhuac laid a good deal of stress upon the order of the figures mentioned, as well as upon the hour during which an individual became sick; and if the illness corresponded to the prevailing sign of the zodiac, then they would make use of the remedial measures or medicines supposed to be the most proper, according to the case.

Such practice was similar to, in fact, not much different from, the methods employed in the 16th century, as followed and recommended by Paracelsus, one of the most distinguished physicians of the Old World.

Paracelsus sought and believed he had found a certain harmony between the different parts or organs of the human body, and the planets, satellites and constellations of the heavens. He thus, for example, held that there was some relation between the heart and the sun; between the brain and Diana, or the moon (the word *lunacy* sufficiently explains itself); and between certain other organs and Mars, Saturn, Mercury, etc., represented in his therapeutics by gold, silver, iron, lead, mercury, etc., respectively, with which mineral remedies he pretended to combat the diseases depending on the actions of these planets.

Having utterly discarded nearly the whole of the dogmatic medicine of most of his predecessors, Paracelsus offered what? And some one has answered:

> Certainly not pure empiricism, or habits of objective observation. He had a dogma of his own—one founded, according to his German expositors, on the views of the Neo-platonists, of which a few disjointed specimens must here suffice.
>
> The human body was a *microcosm* which corresponded to the macrocosm, and contained in itself all parts of visible nature: sun, moon, stars, and the poles of heaven. To know the nature of man and how to deal with it, the physician should study, not anatomy, which Paracelsus utterly rejected, but all parts of external nature. Life was a perpetual germinative process controlled by the in-dwelling spirit or Archeus; and diseases, according to the mystical conception of Paracelsus, were not natural, but spiritual. Nature was sufficient for the cure of most diseases; art had only to interfere when the internal physician, the man himself, was tired or incapable. Then some remedy had to be introduced which should be antagonistic, not to the disease in a physical sense, but to the spiritual seed of the disease.
>
> These remedies were arcana—a word corresponding partly to what we now call specific remedies, but implying a mysterious connection between the remedy and the *essence* of the disease. Arcana were often shown to be such by their physical properties, not only by such as heat, cold, etc., but by fortuitous resemblances to certain parts of the body; thus arose the famous doctrine of signatures, or signs indicating the virtues of natural objects, which afterwards

developed into great complexity. Great importance was also attached to chemically prepared remedies as containing the essence or spiritual quality of the material form from which they were derived. The actual therapeutic resources of Paracelsus included a large number of metallic preparations (as has been already mentioned, such as gold, silver, iron, lead and mercury) in the introduction of some of which he did good service, and, among vegetable preparations, the tincture of opium, still known by the name he gave it, laudanum. In this doubtless he derived much advantage from his knowledge of chemistry, though the science was as yet not disentangled from the secret traditions of alchemy, and was often mixed up with imposture.

Of the followers of Paracelsus some became mere mystical quacks and impostors. Others, of more learning and better repute, were distinguished from the regular physicians chiefly by their use of chemical remedies. In France the introduction of antimony gave rise to a bitter controversy which lasted into the 17th century, and led to the expulsion of some men of mark from the Paris faculty. In England *chemical medicine* is first heard of during the reign of Elizabeth, and was in like manner contemned and assailed by the College of Physicians and the Society of Apothecaries.

I may be pardoned for the foregoing digression; but I have endeavored to show that the original Mexican medicine, partly superstitious, it is true, was imitated and obtained a large following in Europe during the 16th century, which, in some way or other, was probably derived from the practice of the Nahoas, the Toltecs and the Aztecs, through the Spaniards who carried it over there.

The pharmacotherapy of the Mexicans, impartially and carefully examined, rational and scientific in many instances, was at first empirical, tinged with superstition, as was that of Eastern origin. In many respects it was essentially different. For example, in the healing art of the East bloodletting was absolutely proscribed; in Anáhuac, on the contrary, it was extensively employed, and later the same method became quite popular in Europe.

To conclude this imperfect exposition of ancient Mexican pharmacology, I will refer partly and briefly to a therapeutic arsenal that was based largely on observation and actual experimentation. As intimated before, some of the original Mexican remedies are still in use in modern therapeutics.

Among the antispasmodics we recognize the *Artemisia mexicana*, called by the Mexicans *iztauhyatl*, and the rosemary, the *Rosmarinus officinalis.*

Expectorants: *chian*, a species of common sage, the *Salvia hispanica* and a resin obtained from a species of pine, the *Pinus teocote.*

Cathartics: *cuitapatli*, the *Valeriana mexicana*, not to be confounded with *Valeriana officinalis* which is an antispasmodic; *tlapatli*, or common castor oil plant, the *Ricinus communis; nahuiteputz*, or the *Biddens crocata; tlacopatli*, or the *Aristolochia mexicana; temecatl*, or the *Cissus tiliacea; cuauhtzahuatl*, or *Convolvulus arborescens; tepetomatl*, or the *Arctostaphylos tomentosa.*

Laxatives: *hoaxin* or *cuauhnacaztli*, a species of tamarind and the purging cassia or the *Cassia fistula.*

Drastics: *tlanoquiloni* and *tlalantlacuitlapilli*, two species of jalap, the *Exogonium purga*, jalap proper, and the *Batatas jalapa*, respectively; *cuauhmecatl*, or the *Serjania mexicana.*

Diuretics: *hoitziloxitl*, a balsam obtained from the *Myroilum sonsana-*

tense; ulquahuitl, the bark of the rubber plant or *Castilla elastica;* the seeds of *xocoxochitl,* the *Myrtus pimenta; jaltomatl,* the root of *Saracha jaltomata* or *Atropa dentata; yoloxochitl,* the *Magnolia glauca.*

Antipyretics: achiotl, the *Biza orellana; chichicaquihuitl,* the *Sonchus oleraceus; quetzalhuexotl,* the *Salix pentandra; tonalxochitl,* the *Blatta coccinea; totonquixihuitl* or *etzpatli,* the *Calamus draco; cacacoatl,* the *Theobroma cacao.*

Antiperiodics: *chicalotl,* the *Argemone mexicana; cempoalxochitl,* the *Tagetes erecta; epaxihuitl,* the *Croton vulpinum; tlacehuiloni,* the *Geranium hernandezzi.* Some of these were employed in the treatment of the quotidian, and others in that of the tertian and the quartan types of malarial fever, showing that the Mexicans of old were perfectly familiar with the various forms of the disease. It may be said, in passing, that the inhabitants of Anáhuac did not know, it seems, the virtues of the cinchona bark commonly used by the Incas of Peru in the treatment of malaria.

Emmenagogues and oxytoccics: *tlatlancuaye,* a species of *Piper longum; tlalquequetzal,* the *Adianthum trapeciforme; tlilxochitl,* the *Epidendrum vanilla; cocomecaxihuitl,* the *Smilax rotundifolia; yoloxochitl,* the *Magnolia glauca; cihuapatli,* the *Montañoa tomentosa,* to which the Spaniards gave the name of uterine herb (*yerba uterina*) on account of its remarkable effects upon the womb.

Among the anthelmintics the one most commonly used by the Mexicans, was the *epazotl,* the *Chenopodium ambrosioides,* probably the same as the one we now know under the name of *Chenopodium anthelminticum,* employed at present and everywhere for the same purpose.

I could mention a large number of astringents, hemostatics, emollients, insecticides, tonics, alteratives, and other well-classified remedies used by the ancient Mexicans in the treatment of disease; but such a course, though highly interesting, would be quite tedious.

However, I must recall a few of their narcotics, sedatives and anesthetics, agents employed to relieve pain, agents which have always been especially studied and investigated from time immemorial by medical men.

Dioscorides, the Greek physician, mentions in his materia medica, the extract of mandragora as the chief narcotic and hypnotic used in his times, and it seems that the same plant, which belongs to the nightshade family, was also known to the Aztecs under the name of *tepillalilonipatli.* These people were likewise familiar with a species of poppy (classification unknown), which they called *ololiuhqui.*

Besides these two plants, the ancient Mexicans made use of the following: *marihuana,* or Indian hemp, or hashish, the *Cannabis indica; tlapatl,* or Jamestown weed, the *Datura stramonium; tetlatia,* the *Rhus radicans;* tomatl, the *Physalis angulata; yoyotli,* the *Thevetia yccotli; tohonechichi,* the *Solanum nigrum; hoitziloxitl,* the *Myrospermum pereiræ; coaptli,* the *Comelina tuberosa; picietl,* or common tobacco, the *Nicotina tabacum; xumetl,* a species of honeysuckle, the *Sambucus mexicana; chicalotl,* the *Argemone mexicana.*

It appears that the most important of these narcotic and sedative drugs, and the one most commonly used, was the *Ololiuhqui.*

Those who have read ancient Mexican history will remember that the Toltecs and the Aztecs, in their ceremonial religious rites, practiced human sacrifices for which prisoners of war were especially used.

The assigned victim was placed upon the sacrificial stone, and the priest would then open the breast with the obsidian knife, dexterously taking out the palpitating bleeding heart which would be offered to *Huitzilipochtli*, the god of war.

This might be considered as a horrible, extremely cruel procedure. It was not so, however, for according to express judicial mandate the Mexican convict about to be sacrificed was previously narcotized that he might not suffer physical pain. The drug employed in such cases was precisely the species of poppy referred to: the *Ololiuhqui*.

REFERENCES

1. MONARDES, N. Delle cose, che si portano dell' Indie Occidentali pertinenti all'uso della Medicina. 1574. Same as De las Drogas de las Indias, 1565, Seville, 2 vols. in 8.
2. STEYNEFFER, N. Florilegio Medicinal. 1711.
3. HERNÁNDEZ, F. De la Naturaleza y Virtudes de los Árboles, Plantas y Animales de la Nueva España, en especial de la Provincia de Méjico, de que se aprovecha la Medicina, Méjico, 1615. Reproduced in Latin as: De Historia plantarum novae Hispaniae. Rome, 1648–1651.
4. FERRARIO, G. Il Costume Antico y Moderno de Tutti i Popoli. 1820–1821.
5. DE SAHAGÚN, B. Historia General de las Cosas de Nueva Españ'a. Ed. by Bustamante. Mexico, Valdes, 1829.
6. FLORES, F. A. Historia de la Medicina en México, desde la Época de los Indios hasta la presente. México, 1886.
7. CHAVERO, A. México a través de los Siglos. Mexico, 1888, vol. 1.
8. BAAS, J. H. Outlines of The History of Medicine. Trans. by H. E. Handerson. N. Y., Vail, 1889.
9. PAYNE, J. F. Article on *Medicine*, Encyclopaedia Britannica.

[From Petrus Franciscus Phrygius: Commentarii. Lugduni, 1644.]

EDITORIAL

WASHINGTON AND THE MEDICAL AFFAIRS OF THE REVOLUTION

EVEN with our country's usual unpreparedness for war it is difficult to imagine the utter lack of any medical care or supplies which prevailed among the American soldiers who participated in the early conflicts of the War of Independence. The first actual combats occurred in the neighborhood of Boston and the wounded were cared for by the doctors of that city and its vicinity. One physician of professional eminence, Dr. Joseph Warren, won immortal fame by his death at Bunker Hill, where he was serving as a major-general of militia, and not in a professional manner. After the battle several private houses in the neighborhood were used as hospitals under the charge of General Warren's brother, Dr. John Warren. Shortly afterwards, July 1, 1775, the Provincial Congress of Massachusetts passed an Act providing that each regiment of that Province should have one surgeon and two surgeon's mates, and that each hospital should have two surgeons and two surgeon's mates.

It was not until July 19, 1775, that the Continental Congress took up the question of organizing a medical service for the Continental Army. On that date a committee of three, Robert Treat Paine, of Mass.; Francis Lewis, of New York, and Henry Middleton, of South Carolina, was appointed to report on the method of establishing a "hospital"[1] for the Army, and on July 27, 1775, a plan based on their report was adopted. Its chief features were that for an army of 20,000 men there should be a Director General and Chief Physician, who should have under him four surgeons, one apothecary, twenty surgeons' mates, one clerk, two storekeepers, and one nurse to every ten patients. Dr. Benjamin Church, of Boston, was appointed Director General and Chief Physician of the Army, which at that time consisted mainly of the troops about Boston, where General Washington had arrived on July 2, to assume the chief command. James Thacher[2] then a surgeon's mate, saw him on July 20th and writes in his Journal of that date:

> His Excellency was on horseback, in company with several military gentlemen. It was not difficult to distinguish

---

[1] It should be stated that the term "Hospital" was applied to an organization that had care of the sick and wounded, and not confined as it is today to a building for the reception of patients.

[2] A Military Journal. Boston, 1828.

him from all others; his personal appearance is truly noble and majestic, being tall and well proportioned. His dress is a blue coat with buff colored facings, a rich epaulette on each shoulder, buff under dress, and an elegant small sword; a black cockade in his hat.

Within three weeks of his arrival (July 21, 1773) in the camp at Cambridge Washington wrote to Congress as follows regarding the care of the sick:

> I have made inquiry into the establishment of the hospital, and find it in a very unsettled condition. There is no principal director, or any subordination among the surgeons: of consequence, disputes and contention have arisen, and must continue until it is reduced to some system. I could wish it were immediately taken into consideration, as the lives and health of both officers and men so much depend upon due regulation of this department. I have been particularly attentive to the least symptoms of the smallpox; and hitherto we have been so fortunate as to have every person removed so soon as not only to prevent any communication, but any alarm or apprehension it might give in the camp. We shall continue the utmost vigilance against this most dangerous enemy.

Washington set an example in his own family by causing Mrs. Washington to undergo inoculation while she was in Philadelphia in the spring of 1776. In the same year, 1776, while the army was undergoing a season of repose at Morristown, N. J., Washington had a number of houses in the neighborhood fitted up as inoculation hospitals, and ordered a general inoculation not only of the troops, but also of the people living in the vicinity of the camp.

One of General Washington's first duties in connection with the Hospital was most painful. Dr. Benjamin Church, the first Director General and Chief Physician of the Hospital, had graduated from Harvard in 1754, and besides his high professional standing was well known as a wit and the author of a number of poetical effusions of some merit. He had loudly espoused the Whig cause and was supposed to be an ardent patriot. Within a few months after his appointment he was detected in a treasonable correspondence with the enemy. In October, 1775, he was tried by a court martial, presided over by General Washington himself. Church was found guilty, dismissed from the army, and sent to prison. The following year he received permission to go to the West Indies. Nothing was ever heard of the ship in which he sailed after it left port, and it is supposed it was lost at sea with all on board. There seems to have been considerable doubt about his guilt even in the minds of the members of the court martial which tried him, as evidenced by the lenity with which he was treated.

Church was succeeded as Director General and Chief Physician of the Hospital by Dr. John Morgan, of Philadelphia, a graduate of the University of Edinburgh, and the founder of the first medical college in the Colonies, the Medical School of the College of Philadelphia (then the University of Pennsylvania), in which he occupied the chair of the Theory and Practice of Medicine. Morgan was appointed October 17, 1775, and joined the army near Boston. He at once set to work to overcome the disorder which prevailed in the medical service due to lack of organization and discipline. He required all candidates for positions to pass a strict examination and exercised vigilant supervision over the behaviour and work of the members of the corps. Morgan incurred the enmity of the regimental surgeons by orders that the sick and wounded should whenever possible be transferred from the care of regimental surgeons to the general hospitals and that all supplies to regimental surgeons should be dealt out from the general hospital stores, in order that the latter should thus be in some measure able to control the disposition made of them. Bandages, dressings, medicines and surgical instruments were only procured for the army with the greatest difficulty and Morgan was anxious to make his scanty supplies go as far as possible. Most of the regimental surgeons were with militia regiments and were very jealous of any infringement of what they considered their rights by the Hospital Department of the Continental Army, and even those regimental surgeons who were attached to the Continental Army manifested the same jealous spirit. In September, 1775, a second Hospital was organized for the army operating in Northern New York under the command of General Schuyler. Dr. Samuel Stringer was appointed Director of the Hospital and Chief Physician and Surgeon for the Army in the Northern Department. Stringer assumed that his position was on an equality with that of Morgan and that he was not subordinate to the latter. Owing to Stringer's mismanagement medical affairs in the Northern Army fell into a disgraceful condition. Morgan made every endeavor to remedy the conditions but owing to Stringer's insubordinate attitude he could effect nothing. Congress appointed an investigating committee, and as a result of its report both Morgan and Stringer were discharged from their positions. John Morgan was succeeded by Dr. William Shippen, Jr., his colleague in the Faculty of the Medical School of the College of Philadelphia (University of Pennsylvania), to whose machinations he attributed his discharge. Morgan wrote his famous "Vindication," and several years later was completely exonerated by Congress of the charges which had been made against him.

That Washington was keenly alive to the jealousies and difficulties existing between the Hospital and the regimental surgeons is shown by the following letter addressed by him to Congress on September 24, 1776. He writes:

> No less attention should be paid to the choice of surgeons than other officers of the Army. They should undergo a regular examination, and if not appointed by the Director-General and surgeons of the Hospital, they ought to be subordinate to and governed by his directions. The regimental surgeons I am speaking of, many of whom are very great rascals, countenancing the men in sham complaints to exempt them from duty, and often receiving bribes to certify indispositions with a view to procure discharges or furloughs. But independent of these practices, while they are considered as unconnected with the general hospital, there will be nothing but continual complaints of each other—the director of the hospital charging them with enormity in their drafts for the sick, and they him for denying such things as are necessary. In short there is a constant bickering among them which tends greatly to the injury of the sick, and will always subsist till the regimental surgeons are made to look up to the Director-General of the hospital as a superior. Whether this is the case in regular armies or not, I cannot undertake to say; but certain I am, there is a necessity for it in this, or the sick will

suffer. The regimental surgeons are endeavoring, I am persuaded, to break up the General Hospital, and have in numberless instances drawn for medicines, stores, etc., in the most profuse and extravagant manner for private purposes.

Toner[1] printed a letter which shows how Washington resented an injustice to the surgeons in the army. The British brig *Symetry* had been captured by General Smallwood's troops in the Delaware near Wilmington. In the disposition of the contents of the prize discrimination was shown against the surgeons. Washington wrote to General Smallwood from Valley Forge on January 13, 1778, that Doctor Cochran had shown him the regulations which had been made by the Field Officers for conducting the sale and disposal of the cargo of the *Symetry*, with a letter from the regimental surgeons and mates stating their indignation that they should have been deprived of their rights to share in the distribution of the spoil, and presenting their resignations. He ordered General Smallwood not to proceed with the sale or distribution of any of the articles, except the vessel, until he received further orders, and to send him an inventory of the contents of the ship.

A few days later (January 22, 1778) Washington gave a further proof of his esteem for the medical profession in another letter to General Smallwood. Washington wrote:

> A few days ago I received a very polite letter from Doctor Boyes, Surgeon of the 15th Regiment, British, requesting me to return him some valuable medical manuscripts, taken in the brig *Symetry*. He says, they are packed in a neat kind of portable *library*, and consist of Dr. Cullen's lectures on the practice of med., thirty-nine or forty vols.; Cullen's lectures on the Institutes of Med., eighteen vols.; Anatomical lectures, eight vols.; and Dr. Black on Chemistry, nine vols.; the whole in octavo. If they can be found, I beg that they may be sent up to me, that I may return them to the Doctor. I have no other view in doing this, than that of showing our enemies that we do not war against the sciences.

On March 14, 1777, Washington wrote to John Hancock upon the subject of improving the class of regimental surgeons and mates. He wrote:

> There is one more thing which claims in my opinion, the earliest attention of Congress. I mean the pay of regimental Surgeons, and that of their mates. These appointments are so essential, that they cannot be done without. Their pay in the first instance is so low, so inadequate to the services which should be performed, that no man sustaining the character of a gentleman, and who has the least medical abilities, or skill in the profession, can think of accepting it; that in the latter is so paltry, and mean, that none of the least generosity of sentiment, or pretensions to merit, can consent to act for it. In a word, these are inconveniences of an interesting nature; they amount to an exclusion of those persons, who could perform the duties of those offices; and if not redressed, there is not the smallest probability, that any can be prevailed on, to enter them, again.

When the British evacuated Boston in March, 1776, the main body of the Continental Army was removed to New York City and its vicinity. The following order was issued by General Washington on April 3, 1776, to Dr. Morgan. It exemplifies Washington's deep interest in the proper medical care of his troops and his knowledge and insight as to what steps should be taken to insure it.

---

[1] The Medical Men of the Revolution. Phila., 1876.

As the grand Continental Army under the command of His Excellency General Washington will, as soon as it is practicable, be assembled at New York, you are, with all convenient speed to remove the general hospital to that city. As the sick in different houses cannot be removed, but must be attended until they are able to march, you will leave such surgeons, surgeons' mates, apothecary, and attendants under the direction of ————(name to be filled in by Dr. Morgan) as are necessary for the care of the sick now in the general hospital. The medicines, stores, bedding, etc., not immediately wanted in the general hospital, should be loaded in carts that will be provided next Saturday by the Asst. Quartermaster-General, and sent under the care of a proper officer or officers of the hospital, to Norwich in Connecticut. Upon their arrival there, they will find his excellency's orders, and how and in what manner to proceed from thence, whether by land or sea.

The medicines ordered upon His Excellency's application by the honorable the general court of this province to be taken out of the town of Boston should be sent with the first of the hospital stores that go to Norwich, a careful person having orders to take care of the same. The fixing and completing the regimental medicine chests, according to your plan lately proposed, had better be deferred until your arrival at New York, where that may be set about under your inspection.

As the removal of the general hospital must be attended with such a variety of duty and attention, I must refrain from giving more particular directions, leaving a latitude to your experience and knowledge in your profession to govern and direct all your motions.

Before you leave Cambridge it will be necessary to see a proper regimental medicine chest provided and delivered to each of the surgeons of the four regiments left in garrison there under the immediate command of Major-General Ward; also a chest for Colonel Glover's regiment, on command at Beverly.

Reposing entire confidence in your care, diligence, and zeal for the service, I remain satisfied of your best exertions for the public benefit.

Although one would gather from the above that the Hospital possessed some amount of necessary equipment it cannot have been very much, because a few months later, August 23, 1776, four days before the battle of Long Island, Morgan wrote to Dr. John Warren as follows:

Sir: ——I have sent to the surgeons, desiring the youngest off duty to go to your assistance, and take four mates with him, to carry over five hundred additional bandages, and twelve fracture boxes. I fear they have no scalpels, as whatever I have committed to the hospitals has always been lost. I send you two, in which case, If you want more, use a razor for an incision knife. Let me know from time to time at Long Island.

John Morgan.

Just think of Dr. Morgan's being unable to dole out more than two scalpels to the surgeon who was to have charge of the wounded in what it was anticipated would be a bloody battle, and of the necessity that a razor should be used instead of an incision knife.

Another instance of the importance which Washington attached to a proper organization of the hospital service is found in a letter which he wrote to Congress, forwarding and endorsing a plan drawn up by Drs. William Shippen, Jr., and John Cochrane, for the reorganization of the medical department of the Army. It is dated Morristown, February 14, 1777, and reads as follows:

> I do myself the honor to enclose to you, a plan drawn up by Doctor Shippen, in concert with Doctor Cochran, for the arrangement, and future regulation of the General Hospital. As this plan is very extensive, the appointments numerous and the salaries affixed to them at present large, I did not think myself at liberty, to adopt any part of it, before I laid it before Congress for their approbation. I will just remark, that though the expense attending an hospital upon the enclosed plan, will be very great, it will in the end, not only be a saving to the public, but the only possible method of keeping the Army afoot.
>
> The number of officers mentioned in the enclosed plan, I presume are necessary for us, because they are found so in the British hospitals, and as they are established upon the surest basis (that of long experience, under the ablest physicians, and surgeons), we should not hesitate a moment, in adopting their regulations, where they so plainly tend to correct and improve our former want of knowledge, and method, in this important department.
>
> The pay affixed to the different departments, is, as I said before, great, and perhaps more than you may think adequate to the service. In determining upon the sum that is to be allowed to each, you ought to consider, that it should be such, as will induce gentlemen of character, and skill to step forth; and in some manner adequate to the practice which they have at home; for unless such gentlemen are induced to undertake the care, and management of our hospitals, we had better trust to the force of nature, and our constitutions, than suffer persons entirely ignorant of medicine, to destroy us, by ill directed application. I hear from every quarter, that the dread of undergoing the same miseries, for want of proper care, and attention has much retarded the new enlistments, particularly to the southward. This is another reason for establishing our hospital upon a large, and generous plan. I could wish that Congress would take this matter under their immediate consdieration.

Washington was in close personal friendship with several of the most prominent men in the medical service, and there is no doubt that he profited by their judgment and advice in many matters connected with it. Among those thus honored should be mentioned particularly Dr. John Cochran and Dr. James Craik.

Dr. Cochran was a native of Chester Co., Pa. He studied medicine under a Dr. Thompson, of Lancaster, Pa., but never attended any medical college. He served as a surgeon in the war with the French and Indians in 1755. In 1776 he offered his services as a volunteer in the Hospital, and in the following year Washington recommended him to Congress as follows:

> I would take the liberty of mentioning a gentleman whom I think highly deserving of notice, not only on account of his abilities, but for the very great assistance which he has afforded us in the course of this winter, merely in the nature of a volunteer. This gentleman is Dr. John Cochran, well known to all the faculty. The place for which he is well fitted, and which would be most agreeable to him, is Surgeon General of the Middle Department; in this line he served all the last war in the British service, and has distinguished himself this winter, particularly in his attention to the smallpox patients and the wounded.

Dr. Cochran received the appointment he desired as Physician and Surgeon General of the Middle Department. In 1781 he was appointed Director General of the Hospitals of the United States. After the Revolution Cochran settled in New York City. In 1787 Washington appointed him Commissioner of Loans for the State of New York, having as he wrote "a cheerful recollection of his past services."

Dr. James Craik was born in Scotland, where he received his medical education. He accompanied Washington on his expedition against the French and Indians in 1754. The following year he served as a surgeon in Braddock's army, and attended him after he had received his fatal wounds. Washington and he formed a close friendship. Craik served in the Hospital of the Continental Army throughout the Revolution. In March, 1781, he was appointed by Congress Chief Physician and Surgeon General of the Army. At the time of the surrender of Cornwallis, Craik was Director General of the Hospital at Yorktown. In 1777 Craik was instrumental in uncovering the conspiracy formed by Conway and others to oust Washington from his position. In 1780 he was sent by Washington to Rhode Island to arrange hospitals for the French army. After the close of the Revolution he settled near Mount Vernon at the earnest solicitation of Washington. When war with France appeared imminent in 1798 Washington secured him the appointment of Chief Physician and Surgeon of the Army. He had the melancholy duty of attending Washington on his deathbed. Washington mentioned Craik in his will as, "My compatriot in arms, my old and intimate friend."

It is curious that throughout Washington's active military life, particularly during the hot fights in which he participated during the war with the French and Indians, he was never wounded. On the day of Braddock's defeat he had two horses shot under him and four bullets passed through his coat and Washington Irving says that Dr. Craik, "who was on the field attending to the wounded, watched him with anxiety as he rode about in the most exposed manner, and used to say that he expected at every moment to see him fall."

BOOK REVIEWS

The Foundations of Medical History. By Sir D'Arcy Power, K.B.E., F.R.C.S. (Eng.). Balt., Williams & Wilkins Co., 1931.

The Institute of the History of Medicine of Johns Hopkins University is to be thanked and congratulated upon this, the first publication to be issued under its aegis. Sir D'Arcy Power, the first Visiting Lecturer at the Institute, served in that capacity during the months of November and December, 1930, and these lectures were delivered by him during that period. They are six in number and cover a wide range.

The first is the story of St. Bartholomew's Hospital, the oldest British Hospital, and one of the most famous institutions in the world. Sir D'Arcy has served it for more than fifty years, and no one could be more familiar than he with its history. Founded by Rahere in 1193 the story of the vicissitudes and development of this venerable hospital is most fascinating. Until the Reformation it was under ecclesiastical control and had a narrow escape from destruction in 1542 when Henry VIII seized the revenues, and turned the monks out of the priory. There have been many great men who have served "Bart's" in various capacities and Sir D'Arcy gives a brief but adequate account of their services. In Lecture II, "Dining with our Ancestors," Sir D'Arcy deals with the eating customs of man from prehistoric times to within recent times. This is most amusing and informative and explains many customs which remain to the present day in Great Britain and on the Continent. Lecture III on "Biography" will be of great help to anyone who is called upon to write a biography, whether long or short. It is an exposition of the principles of biography writing made by one who is an acknowledged expert in that line. Chapter IV, "Iconography," is also one of great practical value for the same reason as Chapter III. Drawing on his own experience the author illustrates the fascination and difficulties of iconography by recalling his labors in that direction concerning William Harvey and Ambroise Paré. The fact that Sir D'Arcy Power is a former president of the Bibliographical Society as well as the evidence of his many publications on bibliography are sufficient to prove the value of anything he may write upon the subject of Bibliography, which constitutes that of Lecture V, one of the most delightful in this series. The last lecture on "Aristotle's Masterpiece" is an amusing account of the characteristics and history of a book which has been published in many forms for hundreds of years, and continues to appear in cheap reprints largely because of its lewd appeal. It has, of course, long lost any likeness to a genuine composition by the Stagyrite.

This book is one of the most informative and delightful of recent publications on medical history. The lectures on Biography, Iconography and Bibliography are of special importance as guides to methods of study.

Imhotep to Harvey. Backgrounds of Medical History. By C. N. B. Camac, M.D. Foreword by Henry Fairfield Osborn, SC.D., LL.D. N. Y., Paul B. Hoeber, Inc., 1931.

This delightful little volume does not claim to be a "history of medicine" but we have encountered no book equal to it as a guide to that vast subject to those who propose either to study or teach it. It is particularly valuable for the clues it offers to those desirous of pursuing the study of some particular epoch or development in medicine. Concisely but elegantly written it condenses in each section or chapter the chief leaders of a period, gives a brief account of their achievements, mentions their most important writings and indicates the books in which further information may be sought. There are many useful tables and charts which give at a glance very excellent sources on the various subjects referred to in the text. The author has refrained from filling his pages with biographic or personal details but indicates where these may be readily found. He confines himself more to the broad historic or philosophic conceptions connected with the succeeding periods from Imhotep to Harvey, and hence fulfils most excellently the purpose set forth in his title of giving the backgrounds of medical history. The last section contains a number of "Historic Records and Quotations from Various Sources." These are well chosen and calculated to stimulate research on the part of the reader. Dr. Camac has written a book which will be most helpful to both teachers and students. It is based on his practical experience in the former capacity and every page shows his familiarity not only with medical history but with the history of scientific thought and civilization.

OSLER AND OTHER PAPERS. By William Sydney Thayer, M.D. Balt., Johns Hopkins Press, 1931.

This book contains a collection of previously published papers or addresses which are well worth rescuing from the pages of the various periodicals in which they are more or less buried and preserving them in more accessible form. The first group of papers are devoted to Sir William Osler and are valuable additions to our knowledge of that great man's character and personality. In spite of the mass of material which has been published about Osler there seems to be no end to the new sidelights which can be presented by his former associates and friends, bearing upon various aspects of his life. Dr. Thayer's association with Osler was peculiarly intimate and his recordation of it is delightful. One is not able to go into details concerning all the twenty-four contributions which are contained in this volume but two which are especially notable are devoted to Laennec and to John Bright. The Author is an appreciative and sincere admirer of both these men and in these essays he sums up their achievements in the most delightful way. Dr. Thayer is so well known as a charming as well as an authoritative speaker that it is unnecessary to go into details as regards the various addresses which fill up the rest of this volume. Suffice it to say that we can assure the prospective reader that its pages will afford him interest and recreation in the fullest measure.

A DOCTOR OF THE 1870'S AND 80'S. By William Allen Pusey, M.D. Springfield, Ill., Charles C. Thomas, 1931.

One hears on every side of the passing of the family doctor and of the disappearance of the old type of country practitioner. In this delightful little account of the life of his father Dr. Pusey depicts the character and manner of life and practice of one who was a fine example of the best type of country doctor. Dr. Robert A. Pusey lived and practiced in Elizabethtown, the county seat of Hardin County, Illinois, and his career is typical of thousands of other men who were scattered at that time throughout the United States. His son, who has since become one of the foremost dermatologists of our country, had the opportunity of observing his father's daily routine of life and has had the happy thought of embodying them in this little book. The picture is one of a past which has gone forever. Making his diagnoses without the aid of *x*-rays, blood examinations and the innumerable other aids now available, Dr. Pusey nevertheless was able to make his diagnosis in most cases correctly, and by intuition, experience and availing himself of such opportunities as he possessed of reading recent medical literature, to give relief. He lived in a transition period and his portraiture is valuable as a contribution to the history of a period which has now gone.

ROENTGENOLOGIC STUDIES OF EGYPTIAN AND PERUVIAN MUMMIES. By Roy L. Moodie, M.D. 76 Plates in Photogravure chiefly from Roentgenograms prepared in the Division of Roentgenology of Field Museum. Berthold Laufer, Curator of Anthropology, Editor. Anthropology Memoirs, Vol. III. Chicago, Field Museum of Natural History, 1931.

This large volume constitutes a most important contribution to the science of paleopathology. It is the most complete monograph on the use of the roentgen rays as aids to the study of pathology in mummies so far published and the seventy-six plates illustrating the results demonstrate their great value most clearly. The Author gives a summary of the work heretofore done in this direction. Although the possible value of the roentgen rays has been realized and some studies with them have been made, Dr. Moodie's is the first monograph dealing with a large series of roentgenologic examinations of unopened mummy packs. The usefulness of the rays, as Moodie points out, is interfered with in many instances by certain conditions. Thus in both Egyptian and Peruvian mummies deposits of sand or gravel have infiltrated the wrappings and confuse the shadows very greatly. Also extraneous objects, such as beads, utensils, pottery, etc., offer serious obstacles to correct interpretations. The *x*-rays generally fail to reveal the presence of fractures of the skull or trephine wounds. Thus in the Peruvian skulls, many of which had been trephined, not one showed any evidence of the operation. But these limitations were overbalanced by the amount of information which could be derived from the *x*-rays. Dr. Moodie's plates were made of human mummies from Egypt and Peru, and also of a number of birds and animals. It is impossible to go into their detailed study. We can only refer to a few of his conclusions. The Peruvian mummies numbered a much larger proportion of children than those from Egypt. The mummification was performed after much simpler procedures than in Egypt, as Peruvians seem to have used no embalming materials, merely eviscerating the body, and then tying it up in skins and mats. The Egyptian mummies showed a greater proportion of injuries, fractures and crushes, probably because many of the deceased worked in the construction of the great buildings or monuments of their country. Also the weapons used by the Egyptians were capable of producing much more serious wounds. The Field Museum has performed a great service in sponsoring the publication of such a notable piece of work, and Dr. Moodie has added one more to his list of notable achievements in paleopathology.

HISTORY OF MEDICINE IN THE PROVINCE OF QUEBEC. By Maude E. Abbott, B.A., M.D. Montreal, Can., McGill Univ., 1931.

Originally written for publication in "The Storied Province of Quebec," this history of medicine in the Province is now published separately with additions by Dr. Abbott, already well known as an authority on the subject. Much of the material for the period of the French régime was collected by the late Dr. Ahern, who died before it was finally ready for publication, so that Dr. Abbott has been obliged to undertake that period as well as the subsequent portion originally assigned to her. Few Americans realize the interest and importance of the early history of medicine in Canada. It begins much earlier than in the United States and is much better documented. The Jesuit Relations furnish much information on the medical knowledge and practices of the Indians. The latter were never so thoroughly studied and known elsewhere as they were by the self-sacrificing missionaries who have left such vivid narratives of their labors. Dr. Abbott sums up concisely but thoroughly the important facts to be gleaned from the Relations and other sources concerning Indian medicine. Quite a number of qualified medical men, especially of the class of barber-surgeons, came over to New France in the latter half of the seventeenth century. One of them, Jean Madry, who arrived in Quebec in 1671, was officially entitled Lieutenant in New France of the Chief Barber-Surgeon of the King, and was authorized to found a school to train barber-surgeons in Quebec. Hospitals were founded in the chief settlements at very early dates; The Hôtel Dieu of Québec in 1639; the Hôtel Dieu of Montreal in 1644; the Hôpital Général de Québec in 1692, and the Hotel Dieu des Trois Rivières in 1697, whereas the first hospital in the British Colonies, the Pennsylvania Hospital in Philadelphia, was not founded until 1751.

The most noted physician during the French regime was the distinguished Michel Sarrazin, distinguished as much as a botanist and zoologist as for his skill in medicine. After he had held the appointment of surgeon-major to the troops in Canada and also that of physician to the Hôtel Dieu of Quebec, Sarrazin went back to France because he wished to obtain better professional training than he had had as barber-surgeon, in which capacity he had originally come out to New France. He remained for three years studying in France, and after getting his M.D. at the University of Rheims returned to his duties at Quebec. In 1700 he was appointed médecin du roi and physician to all the hospitals of New France. His contributions to zoology and botany were numerous and important. He discovered and described the "pitcher plant" which perpetuates his name as *Sarracena purpurea*. Sarrazin died in 1734 in his seventy-fifth year.

A distinguished successor to Sarrazin was the physician Jean François Gaultier, whose botanical researches led to the bestowal of his name on the winter-green, *Gaultberia procumbens*. Kalm, the Swedish botanist, who travelled extensively in the British Colonies as well as Canada, speaks in terms of the highest praise of the botanical studies of Gaultier and some of his contemporaries.

In 1750 very strict ordinances were enacted regulating the practice of medicine in New France, provisions being made for the examination of all candidates for licensure. After the British regime had been established, in 1788, a Medical Act was again passed providing that no one should practice physic, surgery or midwifery except with a license from a Board appointed by the Governor. This law antedates any of a similar character in the United States by many years. A very interesting account of the St. Paul's Bay Disease, which seems to have been an epidemic of syphilis in most malignant form, which devastated a large part of the country in the latter part of the eighteenth century. The story of the development of organized medical legislation began with the foundation of the McGill Medical School, now one of the leading medical schools on this Continent. Canadian medicine owed, like medicine in the United States, much of its tradition and inheritance to Edinburgh, many of the men most active having been graduates of that University. This heritage has been well sustained by their successors.

Dr. Abbott's book closes with the period when R. P. Howard, William Osler and many others were making Montreal a great medical center. The author has written an excellent book on an important subject. It is by far the best contribution to it which has appeared. It should be read not only for the facts bearing on Canadian medical history but as an invaluable contribution to the history of medical culture in the eighteenth century.

MEDICINE IN VIRGINIA IN THE EIGHTEENTH CENTURY. By Wyndham B. Blanton, M.D. Richmond, Garrett and Massie, Inc., 1931.

This volume is a continuation of Dr. Blanton's book "Medicine in Virginia in the Seventeenth Century" which was published about a year ago, continuing the medical history of Virginia down to the close of the eighteenth century. The work is being issued under the auspices of a committee of the Medical Society of Virginia, which proposes to continue it yet farther in a third volume. Every aspect of the medical history of Virginia is amply covered through the colonial period and its early years of statehood. This aspect of Virginia's history has suffered unmerited neglect until recent years. While the medical history of many of the thirteen original states, notably Massachusetts, Connecticut, New York and Pennsylvania has been thoroughly studied and much written upon, there has appeared but little concerning the profession in a colony where it was on a high level from an early date.

A large proportion of its practitioners possessed medical degrees from trans-Atlantic colleges. Among them were Hugh Mercer, M.D., of Aberdeen, and Arthur Lee, Theodore Bland, Walter Jones and James Craik, who were graduates of Edinburgh. One of the most interesting was William Baynham, a native of Caroline Country, who went to London and worked as an assistant and demonstrator to Joseph Else, the famous anatomist at St. Thomas's Hospital, and Collignon, professor of anatomy at Cambridge. When Else died Cline, who was elected to succeed him, only beat Baynham by one vote. Baynham returned to Virginia where he became renowned as a surgeon and consultant. He performed at least two successful laparotomies for extra-uterine pregnancy. Blanton records the fact that Dr. Jessee Bennett in a frontier settlement in the Shenandoah Valley performed a successful cesarean section on his own wife, removing both ovaries at the same time, in 1794, thirty-three years before Richmond, who is generally accredited with the first cesarean section in America, and fifteen years before McDowell's successful ovariotomy.

Virginia was early in the field in the endeavor to found a medical college, one being organized at William and Mary in 1779, but expiring in three years. Not only does Dr. Blanton tell us fully of the medical publications by Virginians, he also gives us inventories of their libraries which show us what was their mental pabulum. His account of the "shops" kept by physicians at a time when they had to put up their own drugs and prescriptions is most entertaining. The "shop" of Dr. Hugh Mercer is preserved much as it was when he occupied it in Fredericksburg. The account of plantation medicine constitutes a valuable chapter in the social life of the period, showing the attention paid on the large plantations to the health of the slaves.

The annals of the eighteenth century in Virginia contain the names of many physicians who were also distinguished botanists. Among them may be mentioned John Mitchell, who described nine new genera of plants and was elected a Fellow of the Royal Society; John Clayton, after whom the genus Claytonia (spring beauty) was named, whose "Flora Virginica" was published by Gronovius at Leyden, and Mark Catesby, F.R.S., who published a natural history of the Carolinas, Florida, and the Bahama Islands. Blanton gives an interesting account of John Tennent, who exploited rattlesnake root, and went to England where he consorted with "Spot" Ward, the notorious quack, and when he was arrested for bigamy was rescued from jail by the kindness of the famous Sir Hans Sloane.

The alert mind of Thomas Jefferson was frequently occupied on medical matters. It may be recalled that he established a medical department in the University of Virginia, and performed a great service to American medicine when he imported Robley Dunglison to fill one of the chairs. It is impossible in a limited space to do justice to the immense amount of new material brought to light by Dr. Blanton. This handsome, well-illustrated volume is one of the most important contributions made in recent years to American medical history.

INTRODUCTION TO THE HISTORY OF SCIENCE. Volume II. From Rabbi Ben Ezra to Roger Bacon. By George Sarton. Publication No. 376, Carnegie Institution of Washington, Balt., Williams & Wilkins Co., 1931.

It is impossible to do justice to a work such as this in the limited space of a review. Dr. Sarton's previous volume terminated with the period of Omar Khayyam, at the end of the eleventh century. The present, second volume, in two huge parts continues his history through the twelfth and thirteenth centuries, dealing with one of the most complicated and important periods in the history of civilization. These two centuries were the melting pot of three cultures, the Islamic, Jewish and Christian. The student gets very much the impression of watching a moving picture film, in which the picture first shows a predominant Islamic culture, then that culture with a strong Jewish admixture, and then the addition of the Christian culture, which gradually pushes aside the other two and at the close holds the chief place. This is excellently, one might say dramatically, brought forth in the pages of this wonderful work, and nowhere else have the processes of transition and compromise which caused this change of supremacy been better explained. It is hard to realize the close contacts which existed between the three civilizations of the twelfth and thirteenth centuries, so close and so numerous that in many instances the opposing forces seem fused. The reasons why the Christian culture finally triumphed over that of Islam and of the Jews were many and are well studied and brought out as never before in this book. The struggle was between the Eastern and the Western cultures, and it was ended, not by the triumph of Western culture, but by its assimilation of Eastern culture into itself.

Dr. Sarton's great work deals with the history of all the sciences, mathematics, astronomy, chemistry, the natural sciences, etc., and with such important incidental subjects as navigation, travel and exploration, and social conditions. From the point of view of the student of the history of medicine his study of the development of medicine and surgery and the allied sciences leaves nothing to be desired. Nowhere else can one find a more complete study of Islamic and Jewish medicine, of the Salernitan school, and of the beginnings of European medicine. Dr. Sarton presents not merely a study of the individuals who participated in the scientific movements of the twelfth and thirteenth centuries, but goes deeply into the history of the Crusades, the founding of the mendicant orders of monks, the development of universities, and many other factors that profoundly influenced the development of European medicine but which have never been presented in such a brilliant synthetic method before. While all are aware that some knowledge of the state of all the sciences is absolutely essential to an adequate comprehension of the history of medicine, particularly during the period under consideration, such an understanding is very difficult, a difficulty which will be henceforth much lightened by the labors of Dr. Sarton. Nowhere else have we seen due recognition paid in any individual work to the importance to the cultural development of the time of the rise of the Cistercians and other monkish orders, or of the influence of the religious orders of knighthood, those of St. John and the Templars.

Dr. Sarton's treatment of the second half of the twelfth century may be chosen as typical of the method he employs throughout his work. The period is dominated by three men whose work differed entirely each from the other although their united influence typified the scientific work of the period. Gerard of Cremona, the most famous of translators, who went to Toledo and devoted his life to the translation of Arabic scientific works into Latin, and in this way brought the Greek medical classics through the Arabic medicine to the Latin world. Ibn Rushid, more familiar to us as Averrhoes, was an original thinker, investigator and philosopher and Averrhoism was a most powerful influence on all scientific activity for hundreds of years. Of Maimonides Sarton finds it difficult to speak in a few paragraphs because of his great influence not only on medicine but also philosophy. One can form an idea of the magnitude of Dr. Sarton's task when he realizes that though he takes these three great leaders and gives adequate consideration to their work and its effects, he also deals with all the other personalities worthy of any note who flourished contemporaneously with them, and gives due study and space to the political and religious movements of the time. It should be mentioned that Chinese, Japanese, Hindu, and Scandinavian science is dealt with and ample justice done to the scientific labors of these hitherto somewhat neglected foyers of ideas.

The intellectual activity of a large part of the thirteenth century was dominated in Southern Europe by the activities of one of the most remarkable rulers the world has ever seen, Frederick II. the Hohenstauffen. A large part of its literature is represented by such encyclopedic compilations as that of Bartholomew Anglicus and Thomas of Cantimpré. In the latter half of the thirteenth century Roger Bacon is the dominant figure and William Grossteste one of the greatest, but many others, such as Duns Scotus were great stimulant forces. This great work is not only a reference handbook, dictionary or encyclopedia of the science and literature of the twelfth and thirteenth centuries it is a most readable history and picture of the intellectual life of a most important epoch.

MEDICINA IN NUMMIS. A DESCRIPTIVE LIST OF THE COINS, MEDALS, JETONS RELATING TO MEDICINE, SURGERY AND THE ALLIED SCIENCES. By Horatio Robinson Storer, M.D. Edited by Malcolm Storer, M.D. Boston, Wright & Potter Print. Co.

Before the late Dr. Horatio Robinson Storer became known as the greatest authority on medical numismatics of his time he had won fame as a gynecologist. Dr. Storer was born in Boston in 1830, of an old and distinguished New England family, true "Brahmin stock." His father. David Humphreys Storer, was at one time professor of midwifery at Harvard and dean of the medical school. After graduating from Harvard College and Medical School, Dr. Storer studied abroad, and passed a winter in Edinburgh as assistant to Sir James Y. Simpson.

Returning to Boston he began practicing gynecology with great success. In 1872 he suffered from septicemia due to an operation wound, and owing to subsequent ill-health gave up practice, and began to collect and study medals and coins. The latter years of his life were passed at Newport, where he died in 1922. Dr. Storer contributed much of value to numismatic literature and accumulated a most valuable collection of which this book is the catalogue. He presented his collection to the Boston Medical Library as a memorial to his father.

The catalogue is preceeded by an all too short resumé of the subject of "Ancient Medical Medals." In twenty pages Dr. Storer reviews some of the chief subjects of medalic presentation by the Ancients and gives in vivid words an idea of the great knowledge to be derived from their study. Then follows the *catalogue raisonné* of the more than 6000 medals comprised in the collection, with some excellent reproductions of some of the most interesting. A concise, but excellent, bibliography concludes, with the exception of a first class index, this most beautiful volume. The book has been edited by Dr. Malcolm Storer, the collector's son. He has performed a splendid work of filial piety, continuing in the family the tradition which his father originated in dedicating his collection to the memory of his father.

An Introduction to the Literature of Vertebrate Zoology, Based Chiefly on the Titles in the Blacker Library of Zoology, the Emma Shearer Wood Library of Ornithology, the Bibliotheca Osleriana and Other Libraries of McGill University, Montreal. Compiled and Edited by Casey A. Wood, m.d., ll.d. Oxford University Press, Humphrey Milford, London, 1931.

This volume is a great deal more than a mere list of titles or even a *catalogue raisonné*, although it fulfils all the requirements of the latter. It unfolds to the student of vertebrate zoology a wealth of treasures and information bearing upon every aspect of the subject of vertebrate zoology. There was a close connection between the early students of zoology and the medical profession. For two thousand years most of the best work in the study of animal life was done by men who were also scientific physicians. Beginning with Aristotle and continuing with Dioscorides; in the Middle Ages with the great encyclopedists, Vincent of Beauvais, Thomas of Cantimpré and Albertus Magnus; later with Rondeletius, Belon and Conrad Gesner, we find physicians much to the fore in the study of the anatomy and physiology of other animals than man. The influence of such studies on the development of scientific methods and modes of thought in medicine has been incalculable.

Though many are aware of the great value of the library bequeathed by Sir William Osler to McGill University because of the splendid catalogue which has been published of its contents, comparatively few are aware of the treasures contained in the other libraries described by Dr. Wood in this volume. The Blacker and Emma Shearer Wood libraries are not only large collections of books on zoology and ornithology, containing as they do all the books and periodicals of importance on those subjects. They are also unique collections of source material bearing upon the lives and work of the great naturalists of all times and countries, and affording invaluable historical material for the student of the cultural aspect of medicine or natural science. They contain, for instance, over 25,000 letters or unpublished manuscripts written by prominent students of zoology from the seventeenth to the twentieth century, and collections of original drawings and illustrations which are absolutely unsurpassed. As to the books it would be impossible in a limited space to attempt to give an idea of their value. Suffice it to say that there are listed many incunabula and practically all the original editions of the most important works on the natural history of mammals. The Catalogue is prefaced by an "Introduction to the Literature of Vertebrate Zoology" in which, beginning with Aristotle, Dr. Wood gives a concise review of the work done by all the great writers on the subject down to the present day. This is a splendid piece of work, really a monograph of the best type, condensing into 149 pages not only a complete but a most interestingly written summary of the whole field of literature on vertebrate zoology.

This handsome book not only represents an enormous amount of hard work on the part of the Compiler, as Dr. Wood modestly styles himself, but also manifests the erudition of a scholar, and his devotion to his task.

which has
compara-
treasures
described
ne Blacker
raries are
books on
aining as
odicals of
They are
e material
rk of the
and coun-
historical
e cultural
l science.
ver 25,000
ripts writ-
f zoology
twentieth
inal draw-
absolutely
would be
o attempt
Suffice it
any incu-
e original
works on
nals. The
Introduc-
Vertebrate
with Aris-
ise review
eat writers
esent day.
rk, really
condensing
nplete but
mmary of
vertebrate

represents
work on
Dr. Wood
also mani-
r, and his

VOL. 4 1932 NO. 4

ANNALS OF MEDICAL HISTORY

FRANCIS R. PACKARD, M.D. EDITOR PHIL
PUBLISHED BIMONTHLY BY PAUL B. HO
SEVENTY-SIX FIFTH AVENUE, NEW YO

Entered as second class matter June 2, 1917, at the post office at New York, N. Y., under the Act of March 3,
Yearly Subscription, $10.00. Single numbers, $2.00.

ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

CONTENTS OF NEW SERIES, VOLUME ONE, 1929

Thompson, Strenuous Life of a Physician in the 18th Century; Johnson, William Potter Memorial Lecture. Introductory; Cohn, Development of the Harveian Circulation; Burger, Appreciation of the Medical Profession and the Divine Origin of Medicine; Chance, Squier Littell, M.D., Krumbhaar, Bibliographical Matters Pertaining to the Discovery of the Circulation of the Blood; Wood, Martin Lister; Woolf, Hunterian Epoch; Harvey, History of Hemostasis; Miller, William Beaumont and His Book; Burr, Dr. James and His Medical Dictionary; Moore, Gabriel Honore de Riquetti; Roddis, Garcia de Orta; Rush, Arnold Adolf Berthold; Toomey, First General Medical Treatise Published in the Western Hemisphere; Peachey, John Fewster; Power, Memorial Group of the Harvey Family; Krumbhaar, Bath Oliver—Doctor and Biscuit; Wood, Julius Millingen; Robertson, "Castel of Helth" and its Author, Sir Thomas Elyot; Adler, Albrecht von Graefe; Parsons, Haitian Medicine; Hammett, Anatomical Knowledge of the Ancient Hindus; Gudger, Illustrations of Comparative Osteology; Bettin, Charles Edward Isaacs; Walsh, Date of Galen's Birth; Pitfield, A Pitiful, Rickety, Gasping, Staggering, Stuttering Tomfool; Miller, Diseases of Ancient Man; Crummer, Copy of Jenner's Note Book; Strecker, Reminiscences from the Early Days of the Pennsylvania Hospital; Wiese, Larrey; Garrison, Brief Notes on Medical Philately; Pirkner, Epilepsy in the Light of History; Pool & McGowan, Surgery at the New York Hospital One Hundred Years Ago; Rolleston, Samuel Johnson's Medical Experiences; MacPhail, Evolution and Life; Middleton, Philip Syng Physick; Taylor, S. Weir Mitchell; Wagoner, Statuette Depicting a Posterior Superior Dislocation of the Hip; Weeks, David Ramsay; Waring, Incident in Early South Carolina Medicine; Todd, Medieval Physicians; Friedenwald, Manuscript Copies of the Medical Works of Isaac Judaeus; Diploma of a Jewish Graduate of Medicine of the University of Padua in 1695; Brunschwig, Hieronymus Brunschwig; Shryock, Origins and Significance of the Public Health Movement in the United States; Pleadwell, Ninian Pinckney, M.D.; Moodie, Surgery in Pre-Columbian Peru.

CONTENTS OF NEW SERIES, VOLUME TWO, 1930

Rolleston, Sir Thomas Browne; Sudhoff, Sketches; Crummer, Original Drawing of the Title Page of Vesalius' Fabrica; Chance, On Hippocrates and the Aphorisms; Major, History of Taking the Blood Pressure; Franchini, Lazarro Spallanzani; Hall, General and Medical Science 100 Years Ago; Beeson, Orfila—Pioneer Toxicologist; Scarlett, Jean Paul Marat, The Physician as Revolutionist; Wiese, Semmelweis; Pleadwell, Ninian Pinckney; Leake, Roman Architectural Hygiene; Cooper, The Medical School of Montpellier in the 14th Century; Hancock, The Irish School of Medicine; Jacobsen, John Coakley Lettsom and His Relations with Jonathan Carver, Explorer; Camden, Elizabethan Astrological Medicine; Miller, Apollo; Bragman, The Medical Wisdom of Nathaniel Hawthorne; Rolleston, Medical Friendships, Clubs and Societies; Wilson, Alphonse Francois Marie Guerin; Hume, Medicine in China, Old and New; Howell, Doctor George Fordyce and His Times; Beeson, Corvisart, His Life and Works; Shryock, Public Relations of the Medical Profession in Great Britain and the United States: 1600-1870; Incunabula in New York Academy of Medicine, Library of Washington University School of Medicine, Medical Library of the University of Rochester, Cleveland Medical Library Association, Boston Medical Library, Lane Medical Library, Stanford University; Warthin, The Physician of the Dance of Death; Hare, Stephen Girard and the Great Epidemic of Yellow Fever in 1793; Denninger, History of Substances known as Aphrodisiacs; Miller, History of Syphilis; Montgomery, Hieronymus Fracastorius, Author of a Poem Called Syphilis; Hirsch, Historical Survey of Gonorrhea; Leopold, Aretaeus the Cappadocian; His Contribution to Diabetes Mellitus; Jones, Practice of Medicine Among Our Aborigines; Lloyd, Benjamin Rush and His Critics; Peachey, William Hunter's Obstetrical Cases; Caulfield, Infant Welfare Movement in the Eighteenth Century; Rogers, The History of Craniotomy; Tello & Williams, An Ancient Syphilitic Skull from Paracas in Peru; Pitfield, John Keats, Reactions of a Genius to Tuberculosis and Other Adversities; Major, Papyrus Ebers; Moorman, Tuberculosis and Genius as Manifested in St. Francis of Assisi; Goldstein, Influence of Claude Bernard on Physiological Concepts; Middleton, John Syng Dorsey; Freeman, Lewis Morgan; Von Storch, Essay on the History of Epilepsy; Hoover, Significance of the Scientific Conquest of the Air.

CONTENTS OF NEW SERIES, VOLUME THREE, 1931

Corner, Rise of Medicine at Salerno in the 12th Century; Thorndike, Letter from a Physician of Valencia to His Two Sons; Baumann, An Antique Physiological Problem; Abt, Christopher Wilhelm Hufeland; Cutter, Intern Service in the Old Days at Chambers Street Hospital; Seibels, Thomas Dale, M.D.; Franchini, Antonio Vallisneri; Schenck, Mütter Museum; Warthin, Physician of the Dance of Death; Medical Incunabula in the Library of the University of Michigan Medical School, John Crerar Library of Chicago, Library of the College of Physicians of Philadelphia, Library of the Royal College of Surgeons of England; Power, Touchpieces and the Cure of the King's Evil; Bast, Max Johann Sigismund Schultze; Macht, Louis Lewin; Walsh, Refutation of the Charges of Cowardice Made against Galen; Burr, Galen; Major, Landmarks in the History of Lead Poisoning; Miller, The Pneumatic Institution of Thomas Beddoes; Rolleston, History of Cinchona and Its Therapeutics; Elsberg, Edwin Smith Surgical Papyrus; Franchini, Ch. Alphonse Laveran; Drake, Pap and Panada; Reid, John Francis Delong, A Frontier Physician; Podolsky, Physician Physicists; Clemens, Notes on English Medicine (George IV-Henry VIII); Sarma, Hindu Medicine and Its Antiquity; Barkley, Dr. Samuel Bard; Haldin-Davis, Foundations of British Dermatology; Jelks, John Gorrie; Anderson, Thomas Holley Chivers; Chance, Nicholas Culpeper; Peachey, Two Unpublished Letters of Matthew Baillie, M.D.; Moorman, Tuberculosis and Genius—Francis Thompson; Hellman, An Unpublished Diary of Edward Jenner; Elgood, Persian Monograph on Syphilis; Krumbhaar, Erasmus Darwin and His Relation to the Doctrine of Evolution; Cawadias, From Epidauros to Galenos; Wilson, Dr. J. C. Nott and the Transmission of Yellow Fever; Wiese and Gilbert, Theodore Kocher; Shuman, Richard Den's Tomb; Parsons, The Adventurous Goldberger; Montgomery, Naming of Alopecia Areata; Browning, Relation of Physicians to Early American Geology; Lambert, Phineas Fletcher and Francis Quarles and the Purple Island; Lusk, Carl von Voit, Master and Friend; Cravener, An Orthopedic Clinic of 1147 A.D.; Franklin, Richard Lower and His "De Corde"; Beeson, Anton Tchekhov; Kemble, Henry VIII; Moorman, Tuberculosis and Genius—Voltaire; Carson, The Iliac Passion; Weinberg, Gigantism and Acromegaly.